METROPOLITAN NASHVILLE
AND
DAVIDSON COUNTY, TENNESSEE

1999
ANNUAL REPORT

Metropolitan Health Department
Division of Pollution Control

Mayor of Metropolitan Government of
Nashville & Davidson County
The Honorable Bill Purcell

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The Metropolitan Health Department is a team of dedicated individuals who value people and are committed to continuous delivery of quality public health services in a caring and professional manner.

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3. INTRODUCTION

The 1977 Clean Air Act states, "The prevention and control of air pollution at its source is a primary responsibility of state and local governments." Chapter 10.56 of the Metropolitan Code of Laws charges the Metropolitan Board of Health with the responsibility of adopting, promulgating, and enforcing such rules and regulations as necessary to achieve and maintain such levels of air quality as will protect human health and safety, and to the greatest degree practical, prevent injury to plant life and property and foster the comfort and convenience of the inhabitants of the Metropolitan Government area. This report covers the activities conducted by the Metropolitan Health Department, Division of Pollution Control in carrying out these responsibilities for the calendar year 1999.

The purpose and objective of the Division of Pollution Control is to protect and enhance the quality of ambient air in Metropolitan Nashville and Davidson County so as to protect the public health and welfare of the population.

4. ENGINEERING ACTIVITIES

Table I and Figures 1 through 5, present the 1999 annual emission inventory for five criteria pollutants (particulate matter, sulfur dioxide, nitrogen oxide, carbon monoxide, and volatile organic compounds).

Figure 1 shows that miscellaneous sources account for 84% of the total 1999 particulate emissions. Dust from paved roads accounts for 79% of the total particulate emissions. Figure 2 shows that fuel combustion accounts for approximately 67% of the total 1999 sulfur oxide emissions. Figure 3 shows that the on-road and non-road mobile source emissions account for 83% of the total 1999 nitrogen oxide emissions. Figure 4 shows that 87% of the 1999 carbon monoxide emissions are contributed by on-road and non-road mobile sources. Figure 5 shows that on-road and non-road mobile sources account for approximately 5% of the total 1999 volatile organic compound emissions and approximately 21% is contributed by fuel combustion.

Table II and Figure 6, are a comparison of Nitrogen Dioxide and Volatile Organic Compound emissions for the past seven (7) years.

In 1999 an annual hazardous air pollutant emission inventory was completed for the 187 listed hazardous air pollutants. The 1999 hazardous air pollutant inventory is shown in Table III.

During 1999, the Engineering Section reviewed plans and specifications for 78 new and/or modified stationary sources and issued the following permits:

Construction Permits:	75
Operating Permits:	728

In addition to the above permits, 225 permits were issued for asbestos removal and 13 burning permits using an air curtain destructor were issued. Revenue generated from the issuance of permits in 1999 was $585,768.

During 1999 this agency observed the following compliance source tests:

1	Particulate
1	Nitrogen Oxides
3	Volatile Organic Compound
1	Cadmium
1	Lead
2	Hydrogen Chloride
1	Carbon Monoxide
1	Mercury
1	Dioxin/furan
1	Chromium

5. PART 70 OPERATING PERMIT PROGRAM

On October 13, 1993, the Metropolitan Board of Health adopted Regulation No. 13, "Part 70 Operating Permit Program". Subsequently, the Environmental Protection Agency (EPA) granted full approval to the Metropolitan Health Department, Pollution Control Division's Part 70 Operating Permit Program. All affected facilities were required to submit Part 70 Operating Permit Applications to the Pollution Control Division within 12 months of the effective date which was March 15, 1996. The Pollution Control Division received eleven applications during 1997 and six in 1998. All seventeen applications were reviewed and determined to be complete. Subsequently, five Part 70 Operating Permits were issued in 1997, six were issued in 1998 and three were issued in 1999. Of the fourteen original facilities that remain in operation, the following thirteen have received a Part 70 Operating Permit.

Permit Number	Date	Facility Name
70-0039	1997	Vanderbilt University
70-0040	1999	Ford Motor Company
70-0042	1999	The Aerostructures Corporation
70-0045	1998	Bruce Hardwood Flooring, LLC
70-0050	1998	Nashville Thermal Transfer Corp.
70-0074	1997	Ouimet Corporation
70-0081	1998	U.S. Tobacco Manufacturing Co.
70-0120	1999	Peterbilt Motor Company
70-0133	1997	Gibson Fiberglass
70-0141	1998	Whirlpool Corporation
70-0154	1997	Aqua Bath
70-0189	1998	Bordeaux Landfill
70-0241	1997	Vanderbilt Medical Center

TABLE I
1999 NASHVILLE DAVIDSON COUNTY ANNUAL EMISSION INVENTORY

STATIONARY SOURCES—TONS PER YEAR										
	PARTICULATE		SULFUR OXIDES		NITROGEN OXIDES		CARBON MONOXIDE		VOL. ORG. COMP.	
SOURCE CATEGORY	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT
TRANS. & MKT. OF VOC										
VOL Storage & Handling	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.6	0.0
Bulk Gasoline Terminals	0.0	0.0	0.0	0.0	0.0	5.2	0.0	19.2	0.0	275.3
Bulk Gasoline Plants	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0
Tank Truck Unl. (Stage I)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	193.4	0.0
Vehicle Refuel. (Stage II)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	157.6	0.0
Tank Trucks in Transit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0	0.0
SUBTOTAL	0.7	0.0	0.0	0.0	0.0	5.2	0.0	19.2	415.7	275.3
TOTAL AREA + POINT	0.7		0.0		5.2		19.2		691.0	
INDUSTRIAL PROCESSES										
Adhesives	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.3
Aerospace	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.4
Misc. Metal Products	0.9	3.5	0.0	0.0	0.0	2.1	0.0	0.4	48.1	203.1
Inorganic Chemical Mfg.	0.0	16.6	0.0	0.0	0.0	4.2	0.0	1.0	0.1	0.1
Organic Chemical Mfg.	0.0	11.6	0.0	0.0	0.0	10.4	0.0	4,134.7	0.0	953.7
Textile Mfg.	1.7	50.2	0.0	0.0	7.4	0.0	6.2	0.0	1.3	31.3
Rubber Tire Mfg.	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0
Plastic Products Mfg.	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	6.6	39.6
Fiberglass Mfg.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	27.2
Wood Products Mfg.	0.6	12.1	0.0	0.0	0.0	0.0	0.0	0.0	19.4	171.7
Clay & Glass	10.1	182.7	0.0	864.1	0.0	1,863.7	0.0	21.3	0.0	37.6
Mineral Products	58.8	99.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Plants	31.6	11.3	3.2	20.7	20.0	6.2	99.7	84.9	23.0	4.3
Paint Mfg.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	20.0
Food & Agriculture	8.1	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.3
Primary/Sec. Metals	4.8	0.0	1.4	0.0	0.4	0.0	6.6	0.0	0.8	0.0
Fabric/Vinyl Coating	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.0
Large Appliance Coating	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.0
Ship Building	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	118.7	390.8	4.7	884.8	27.8	1,886.6	112.5	4,242.3	124.6	1,743.5
TOTAL AREA + POINT	509.4		889.4		1,914.4		4,354.7		1,868.2	

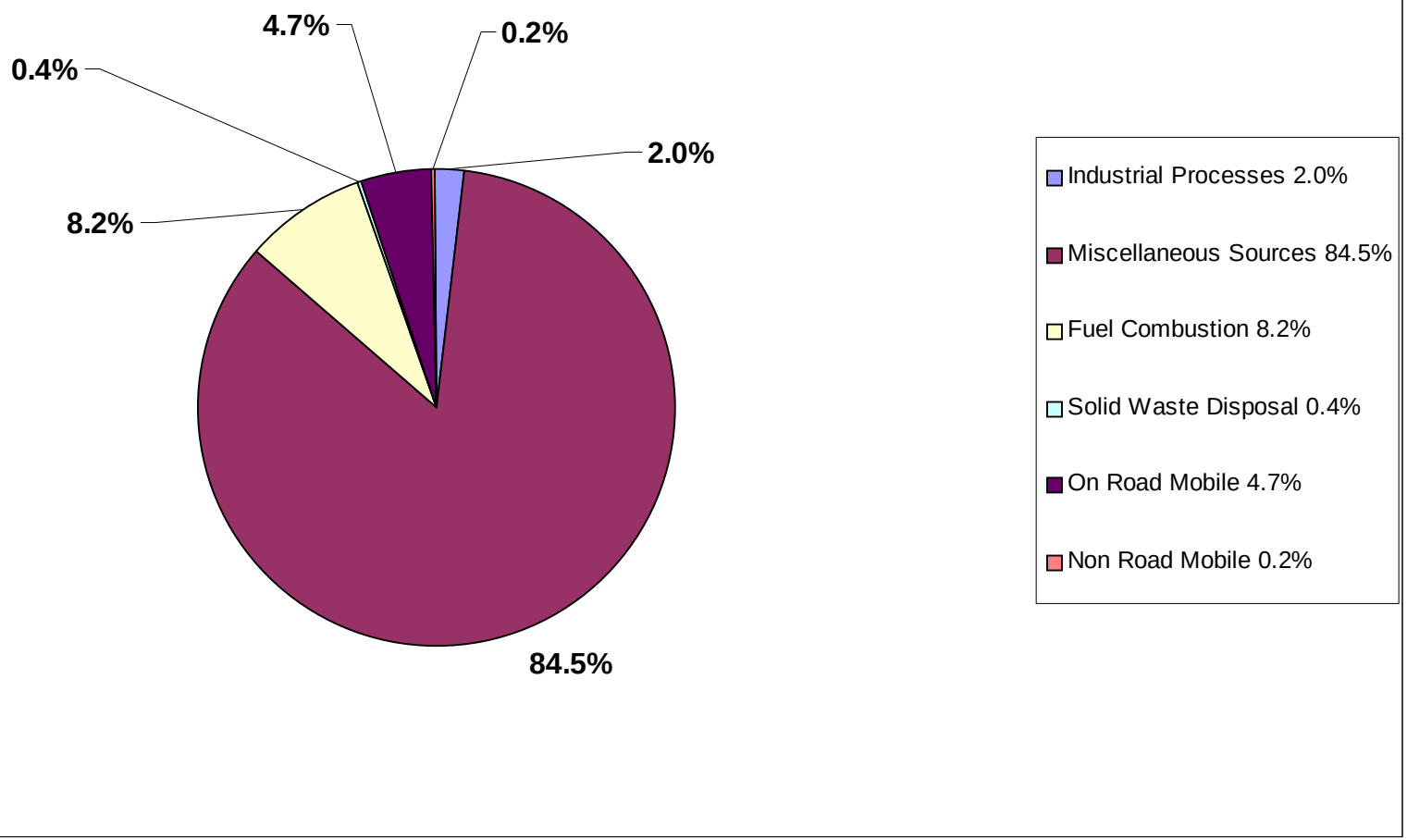
Table 1 continued: 1999 NASHVILLE DAVIDSON COUNTY ANNUAL EMISSION INVENTORY

STATIONARY SOURCES—TONS PER YEAR										
	PARTICULATE		SULFUR OXIDES		NITROGEN OXIDES		CARBON MONOXIDE		VOL. ORG. COMP.	
SOURCE CATEGORY	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT
NON-IND. SURFACE COAT.										
Architectural	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	980.3	0.0
Auto Refinishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	883.3	0.0
Traffic Markings	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	109.8	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,973.4	0.0
TOTAL AREA + POINT	0.0		0.0		0.0		0.0		1,973.4	
OTHER SOLVENT USE										
Cold Cleaners (exc. Perc)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	810.2	0.0
Degreas. (exc. Cold clean.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.2
Graphic Arts	0.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	63.5	216.5
Dry Cleaning (exc. Perc)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0
Cons./Comm. Solv. Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,636.5	0.0
SUBTOTAL	0.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	2,517.2	231.7
TOTAL AREA + POINT	3.3		0.0		0.0		0.0		2,748.9	
MISC. SOURCES										
Pesticide Application	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	480.7	0.0
Landfills	0.0	3.1	0.0	2.0	0.0	7.5	0.0	140.0	0.0	17.2
Scrap and Waste Material	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Biogenic (PCBEIS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dust From Paved Roads	20,178.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Projects	1,081.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural Tilling	74.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	21,333.9	3.1	0.0	2.0	0.0	7.5	0.0	140.0	480.8	17.2
TOTAL AREA + POINT	21,337.0		2.0		7.5		140.0		498.0	
FUEL COMBUSTION										
Residential	1,836.0	0.0	111.1	0.0	536.1	0.0	13,583.5	0.0	5,737.8	0.0
Commercial/Institutional	10.1	13.1	8.5	726.6	137.5	579.5	57.0	293.4	7.4	16.3
Industrial	0.0	203.2	0.0	6,463.7	0.0	1,612.4	0.0	254.6	0.0	18.0
Stationary Internal Comb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	1,846.1	216.4	119.5	7,190.3	673.6	2,192.0	13,640.5	548.0	5,745.2	34.4
TOTAL AREA + POINT	2,062.5		7,309.8		2,865.6		14,188.5		5,779.6	
SOLID WASTE DISPOSAL										
Incinerators	1.7	23.5	0.1	50.4	0.5	456.8	0.4	148.0	1.6	13.0
POTW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.4	0.0
TSDF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Structure Fires (including auto/truck fires)	54.7	0.0	0.0	0.0	0.3	0.0	390.6	0.0	62.9	0.0
Forest & Grass Fires	14.3	0.0	0.0	0.0	0.0	0.0	90.4	0.0	13.4	0.0
SUBTOTAL	70.8	23.5	0.1	50.4	0.9	456.8	481.5	148.0	100.4	13.0
TOTAL AREA + POINT	94.3		50.5		457.7		629.5		113.4	
TOTAL STATIONARY SOURCES	23,370.5	636.8	124.3	8,127.4	702.3	4,548.0	14,234.5	5,097.4	11,357.3	2,315.1
TOTAL STA. AREA + POINT	24,007.3		8,251.7		5,250.3		19,332.0		13,672.4	

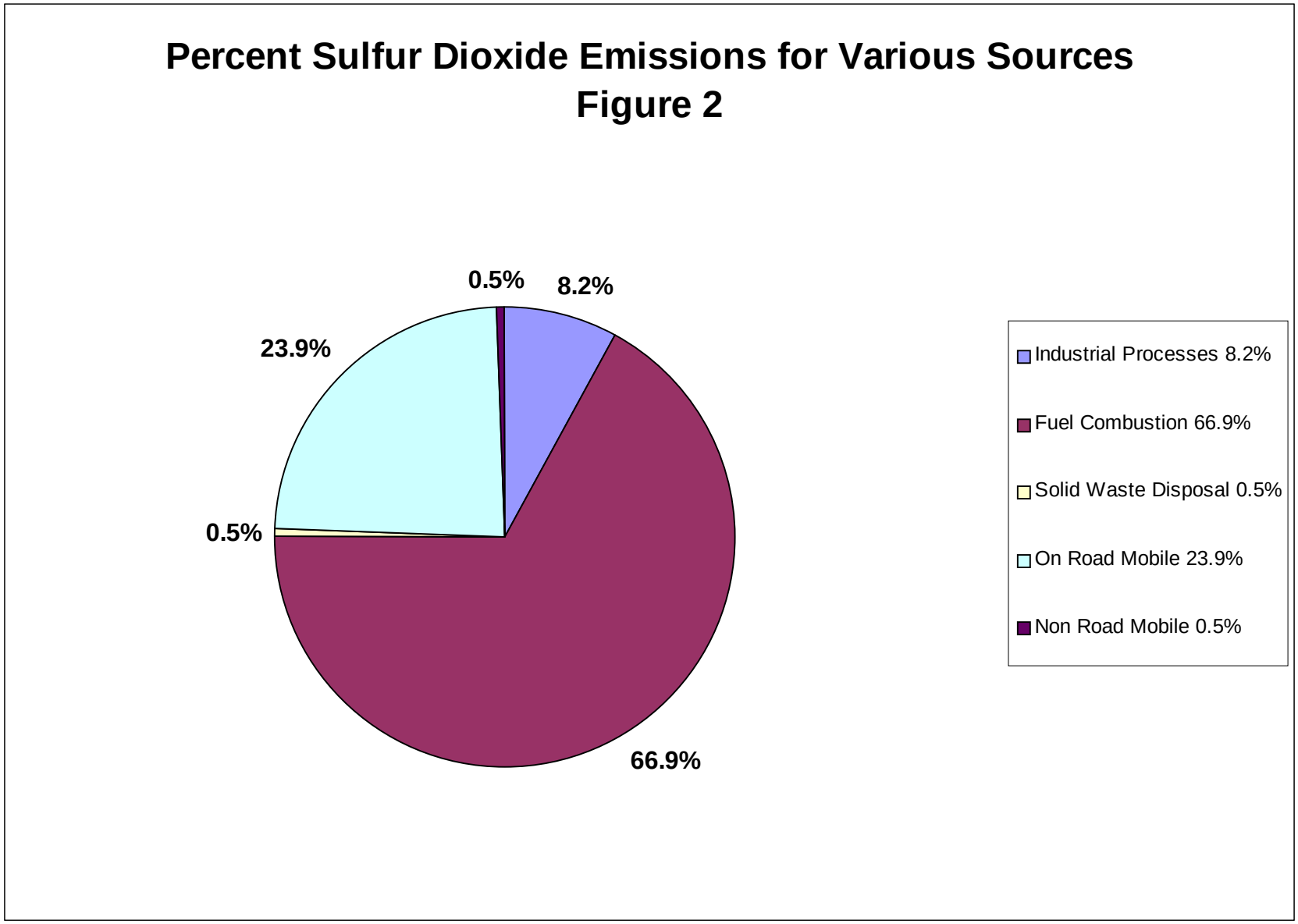
TABLE I (continued)
1999 NASHVILLE DAVIDSON COUNTY ANNUAL EMISSION INVENTORY

MOBILE SOURCES—TONS PER YEAR										
	PARTICULATE		SULFUR OXIDES		NITROGEN OXIDES		CARBON MONOXIDE		VOL. ORG. COMP.	
SOURCE CATEGORY	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT
ON-ROAD MOBILE										
LDGV	284.8	0.0	726.0	0.0	9,696.4	0.0	67,415.7	0.0	6,522.9	0.0
LDGT1	61.3	0.0	216.2	0.0	2,339.9	0.0	17,853.9	0.0	1,651.7	0.0
LDGT2	14.6	0.0	51.7	0.0	772.1	0.0	5,666.7	0.0	544.4	0.0
HDGV	67.5	0.0	58.8	0.0	1,044.4	0.0	6,154.5	0.0	371.9	0.0
LDDV	17.5	0.0	30.6	0.0	83.0	0.0	60.6	0.0	26.1	0.0
LDDT	5.3	0.0	8.5	0.0	26.3	0.0	18.4	0.0	9.7	0.0
HDDT	742.2	0.0	1,516.9	0.0	7,016.2	0.0	3,577.4	0.0	679.1	0.0
MC	0.9	0.0	0.5	0.0	22.8	0.0	296.1	0.0	45.8	0.0
SUBTOTAL	1,194.1	0.0	2,609.3	0.0	21,001.1	0.0	101,043.3	0.0	9,851.6	0.0
TOTAL AREA + POINT	1,194.1		2,609.3		21,001.1		101,043.3		9,851.6	
NON-ROAD MOBILE										
Railroad Locomotives	8.7	0.0	26.0	0.0	358.8	0.0	49.1	0.0	19.4	0.0
Aircraft	49.2	0.0	31.2	0.0	598.4	0.0	1,796.0	0.0	253.3	0.0
33-City Study/Off Highway	0.0	0.0	0.0	0.0	3,627.4	0.0	31,067.8	0.0	4,001.5	0.0
SUBTOTAL	57.9	0.0	57.2	0.0	4,584.6	0.0	3,2912.9	0.0	4,274.2	0.0
TOTAL AREA + POINT	57.9		57.2		4,584.6		32,912.9		4,274.2	
TOTAL MOBILE SOURCES	1,252.0	0.0	2,666.5	0.0	25,585.7	0.0	133,956.2	0.0	14,125.8	0.0
TOTAL MOBILE AREA + POINT	1,252.0		2,666.5		25,585.7		133,956.2		14,125.8	
TOTAL STATIONARY + MOBILE	24,622.5	636.8	2,790.8	8,127.4	26,288.0	4,548.0	148,190.7	5,097.4	25,483.1	2,315.1
GRAND TOTAL AREA + POINT	25,259.3		10,912.2		30,836.0		153,288.1		27,798.2	

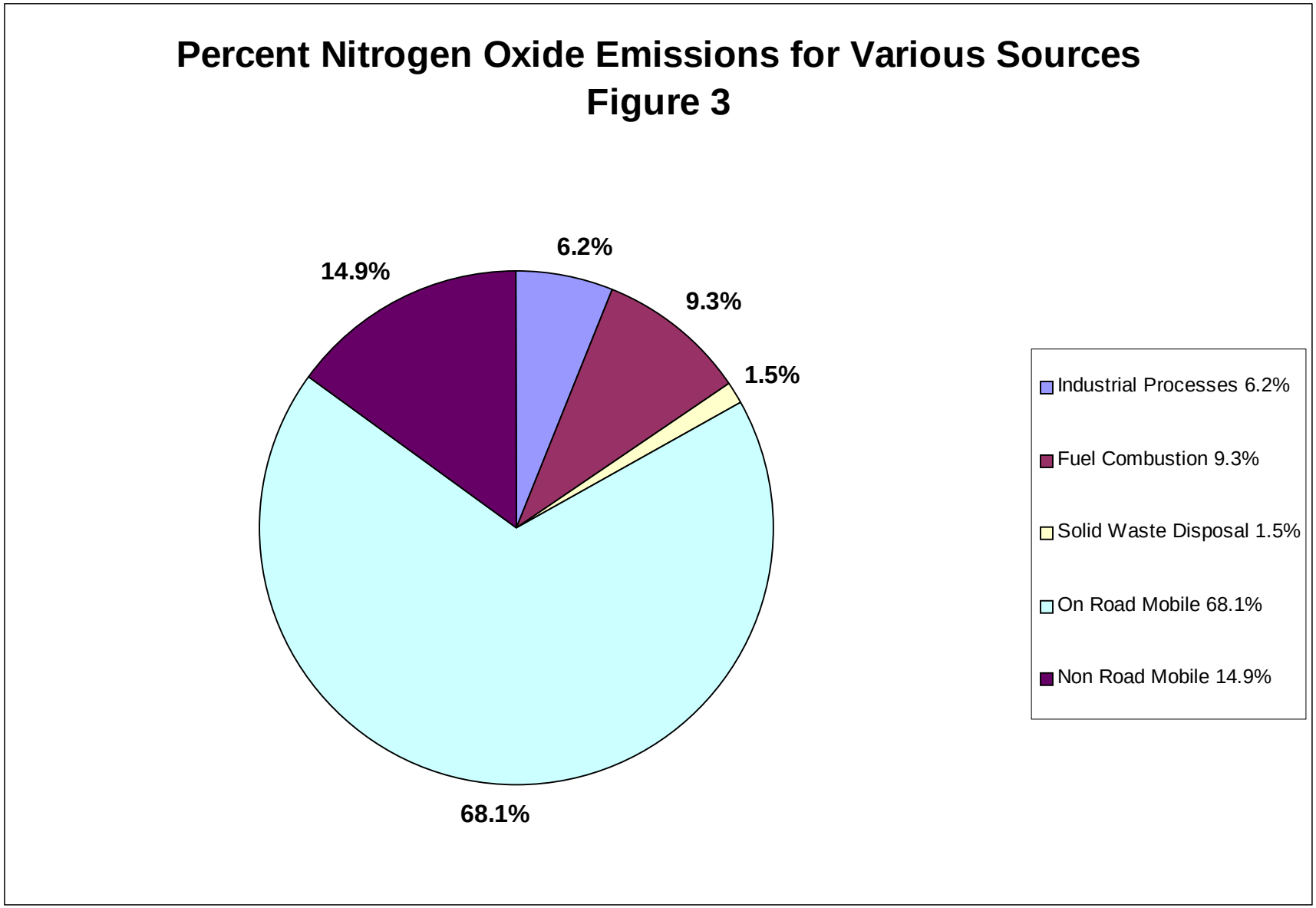
Percent Particulate Emissions for Various Sources
Figure 1



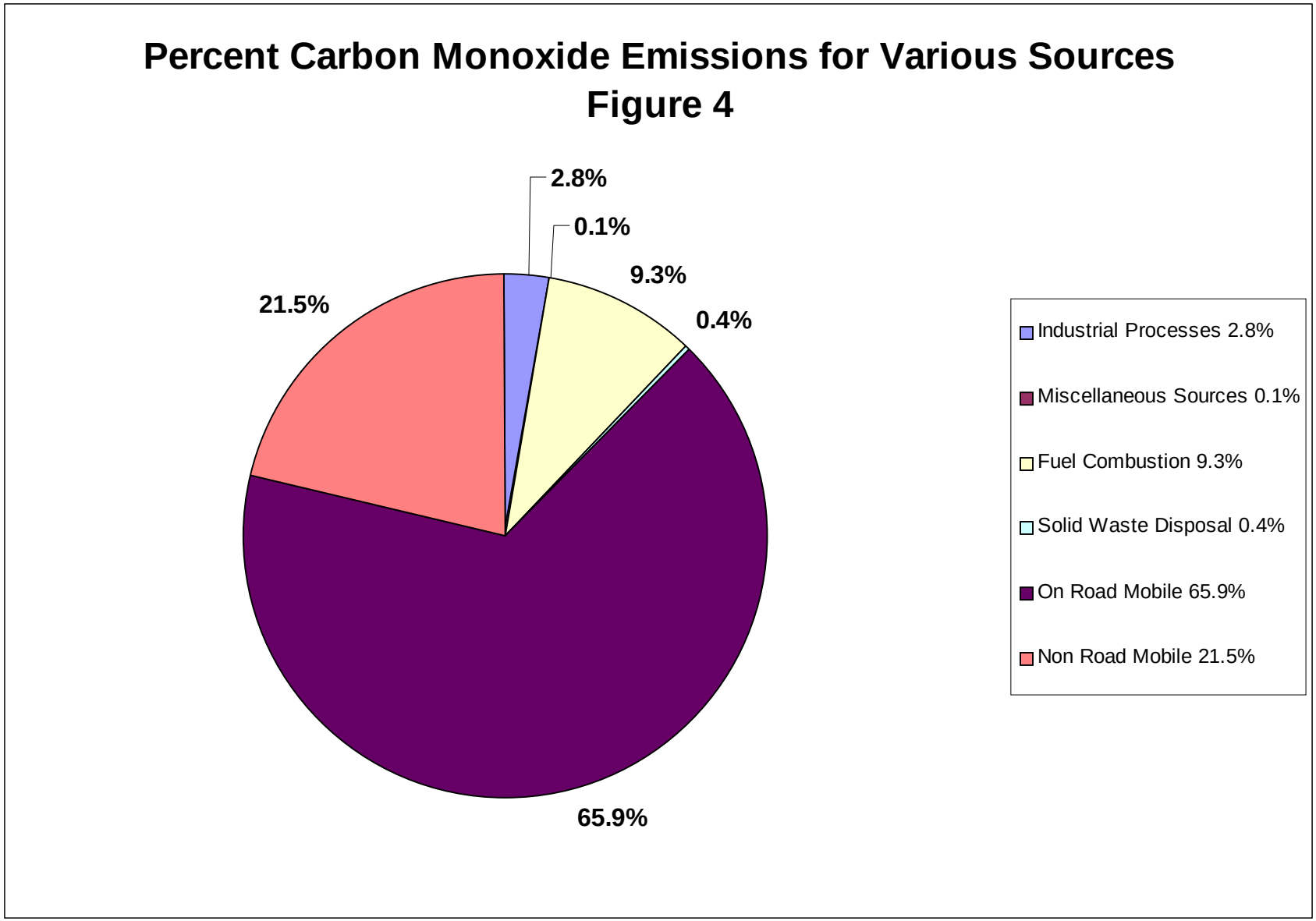
Percent Sulfur Dioxide Emissions for Various Sources
Figure 2



Percent Nitrogen Oxide Emissions for Various Sources
Figure 3



Percent Carbon Monoxide Emissions for Various Sources
Figure 4



Percent Volatile Organic Compound Emissions for Various Sources
Figure 5

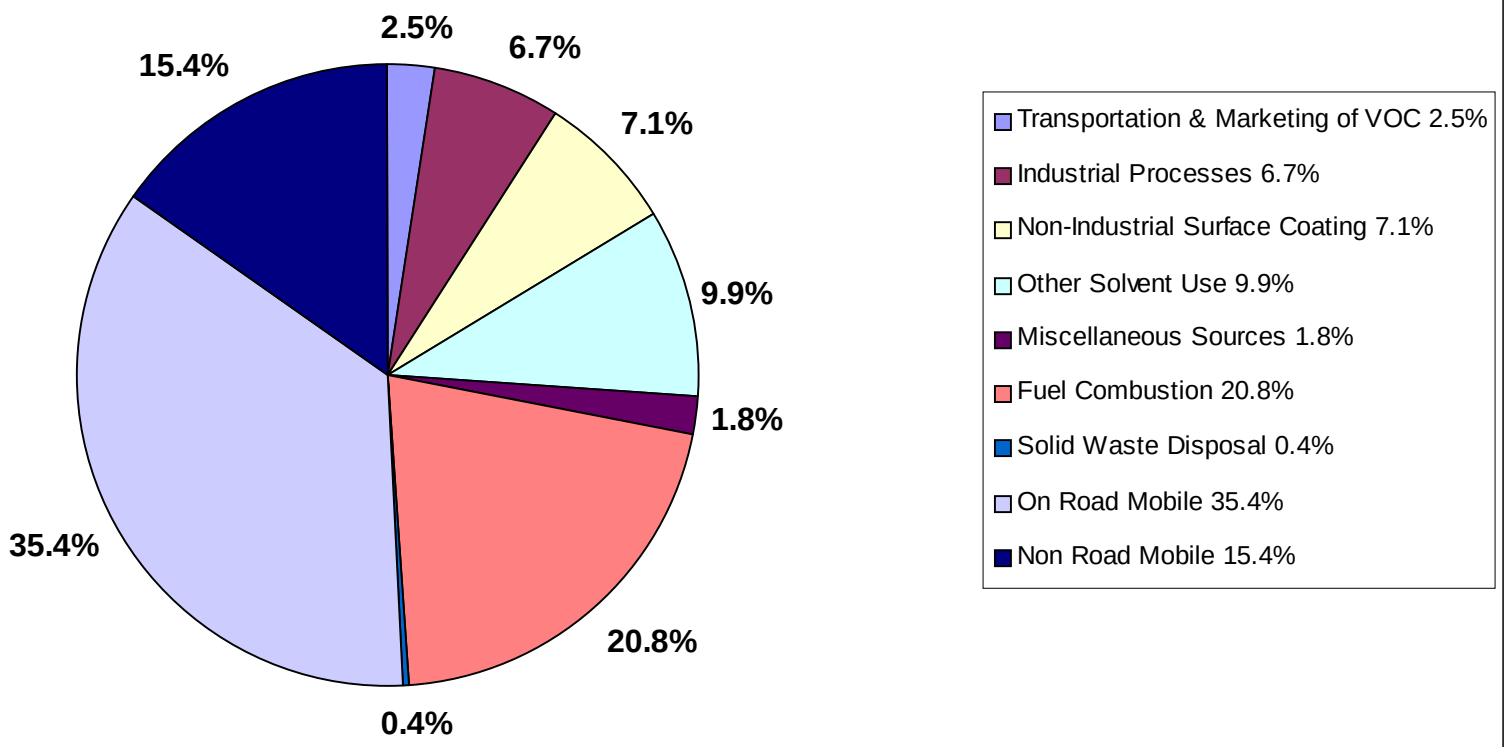


TABLE II
1993 – 1999 Annual Comparison of Nitrogen Dioxide and Volatile Organic Compound Emissions

NITROGEN DIOXIDE (TONS/YEAR)

Source Category	1999	1998	1997	1996	1995	1994	1993
Transportation & Marketing of VOC	5	5	4	6	3	0	0
Industrial Process	1,914	1,877	2,146	1,765	1,307	1,674	1,801
Other Solvents	0	0	8				
Miscellaneous	8	6	28	28	16	0	0
Fuel Combustion	2,866	3,023	3,331	3,251	2,626	3,012	2,711
Solid Waste	458	501	457	452	459	480	572
On-Road Mobile	21,001	20,754	21,216	2,940	21,771	21,691	17,550
Non-Road Mobile	4,585	4,511	4,309	4,423	4,464	4,544	3,994
TOTAL	**30,836**	**30,677**	**31,499**	**30,865**	**30,647**	**31,399**	**26,644**

VOLATILE ORGANIC COMPOUND (TONS/YEAR)

Source Category	1999	1998	1997	1996	1995	1994	1993
Transportation & Marketing of VOC	691	696	683	729	883	1,490	1,787
Industrial Processes	1,868	2,579	2,185	2,651	1,730	1,666	2,032
Non-Industrial Surface Coating	1,973	1,920	1,898	1,951	2,182	2,436	1,930
Other Solvents	2,749	2,752	2,760	2,747	2,844	2,837	3,145
Miscellaneous	498	507	569	572	204	233	236
Fuel Combustion	5,780	5,716	5,679	5,639	5,563	5,556	5,477
Solid Waste	113	157	128	196	235	224	252
On-Road Mobile	9,852	9,412	9,150	8,770	9,646	10,044	9,621
Off-Road Mobile	4,274	4,257	4,615	2,713	3,196	3,313	3,573
TOTAL	**27,798**	**28,016**	**27,666**	**25,967**	**26,482**	**27,799**	**28,053**

Annual Comparison of Nitrogen Oxides and VOC Emissions
Figure 6

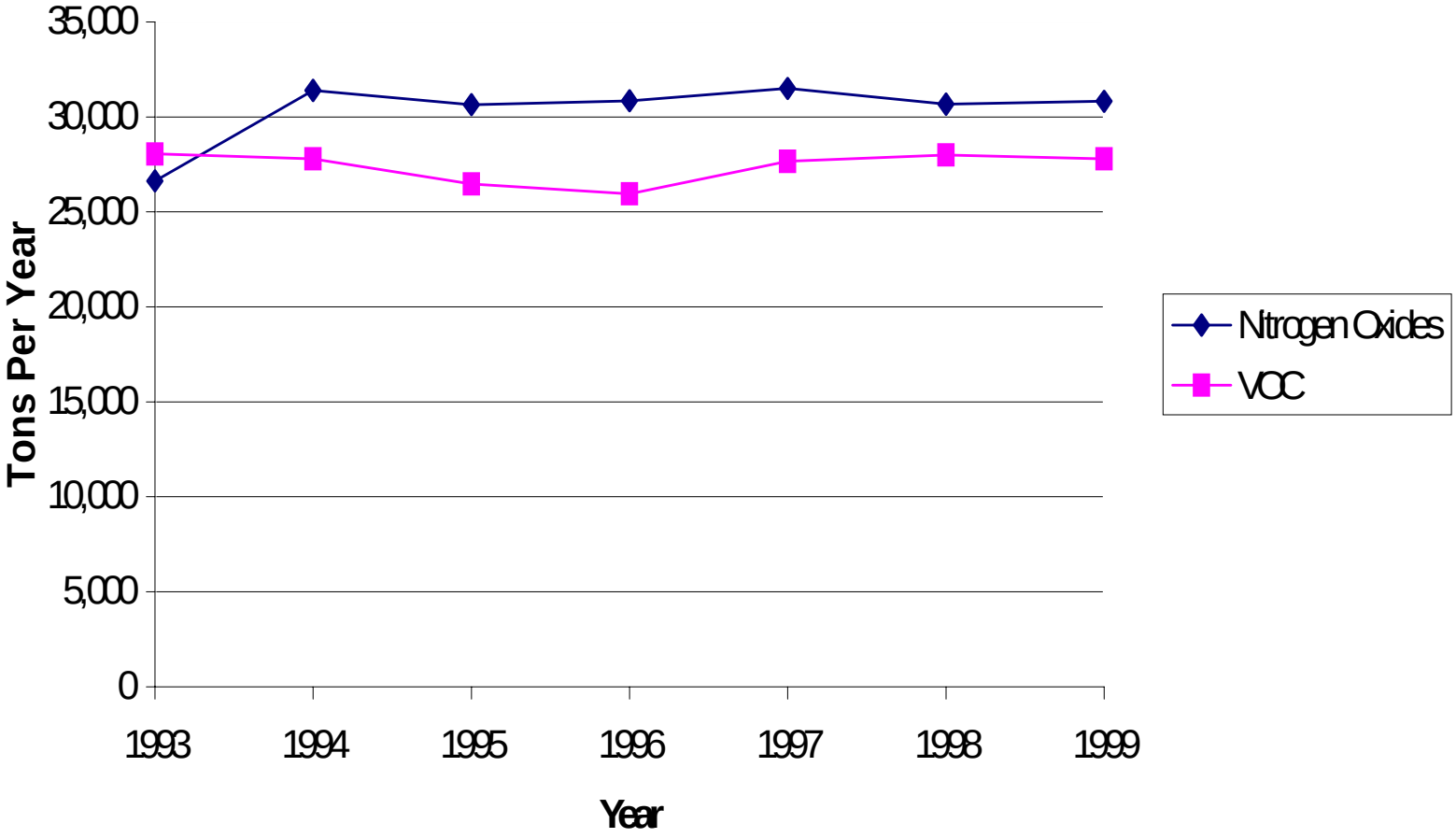


TABLE III
1999 Nashville & Davidson County Hazardous Air Pollutant Emission Inventory

POLLUTANT	CAS #	TPY
1,1,2,2-Tetrachloroethane	79-34-5	0.062
1,2,4-Trimethylbenzene	120-82-1	0.055
1,3-Butadiene	106-99-0	148.295
1,3-Dichloropropene	542-75-6	43.208
1,4-Dichlorobenzene	106-46-7	22.517
1,4-Dioxane	123-91-1	21.893
2,2,4-Trimentylpentane	540-84-1	198.021
2,4-Toluene Diisocyanate	584-84-9	0.002
2-Chloroacetophenone	532-27-4	0.001
2-Nitropropane	79-46-9	0.092
4,4'Methylenediphenyl Diisocyanate	101-68-8	0.021
Acetaldehyde	75-07-0	193.608
Acetophenone	98-86-2	4.904
Acetylene	74-86-2	41.490
Acrolein	107-02-8	7.830
Acrylic Acid	79-10-7	1.620
Acrylonitrile	107-13-1	0.112
Antimony	00-00-0	0.010
Arsenic	00-00-0	0.091
Benzene	71-43-2	343.570
Benzyl Chloride	100-44-7	0.161
Biphenyl	92-52-4	15.268
Bis (2-Ethyl Hexyl) Phthlate	117-81-7	0.521
Bromoform	75-25-2	0.005
Butyl Alcohol	71-36-3	0.115
Cadmium	00-00-0	0.012
Carbon Disulfide	75-15-0	0.082
Carbon Tetrachloride	56-23-5	0.041
Carbonyl Sulfide	463-58-1	0.010
Chlorine	7782-50-5	2.480
Chlorobenzene	108-90-7	19.460
Chloroform	67-66-3	0.458
Chromium	00-00-0	0.416
Cobalt	00-00-0	1.286
Cresols	1319-77-3	0.001
Cumene	98-82-8	1.647
Cyanide	00-00-0	0.574
Dibenzofurans	132-64-9	0.002
Dibutyl Phthlate	84-74-2	0.395
Diethanolamine	111-42-2	0.253
Dimethyl Formamide	68-12-2	3.072
Dimethyl Phthlate	131-11-3	0.001
Dimethyl Sulfate	77-78-1	0.006
Dioctylphthlate	117-81-7	0.001
Ethyl Chloride	75-00-3	2.214
Ethylbenzene	100-41-4	137.560
Ethylene Dichloride	107-06-2	0.042
Ethylene Glycol	107-21-1	45.723
Ethylene Oxide	75-21-8	4.355

TABLE III (continued)
1999 Nashville & Davidson County Hazardous Air Pollutant Emission Inventory

POLLUTANT	CAS #	TPY
Ethylidine Dichloride	75-34-3	0.105
Formaldehyde	50-00-0	318.680
Glycol Ether	00-00-0	46.678
Hexamethylene 1,6-Diisocyanate	822-06-0	0.526
Hexane	110-54-3	260.493
Hydrochloric Acid	7647-01-0	450.158
Hydrogen Fluoride	7664-39-3	46.675
Hydroquinone	123-31-9	0.093
Isophorone	78-59-1	0.391
Lead	00-00-0	1.083
Magnesium	00-00-0	1.100
Manganese	00-00-0	1.180
Mercury	00-00-0	0.087
Methanol	67-56-1	491.267
Methyl Bromide	74-83-9	83.753
Methyl Chloride	74-87-3	1.938
Methyl chloroform	71-55-6	104.964
Methyl Ethyl Ketone	78-93-3	102.148
Methyl Hydrazine	60-34-4	0.042
Methyl Isobutyl Ketone	108-10-1	25.823
Methyl Methacrylate	80-62-6	0.892
Methyl tert-butyl ether	1634-04-4	5.760
Methylene Chloride	74-87-3	49.678
m-Xylene	108-38-3	36.148
Naphthalene	91-20-3	28.965
Nickel	00-00-0	0.090
o-Xylene	95-47-6	192.084
Phenol	108-95-2	0.316
Phosphine	7803-51-2	0.320
Phthalic Anhydride	85-44-9	0.972
Polycyclic Organic Matter	00-00-0	80.557
Propionaldehyde	123-38-6	51.864
Propylene Dichloride	78-87-5	0.007
Propylene Glycol	57-55-6	1.510
Propylene Oxide	75-56-9	0.297
p-Xylene	106-42-3	248.297
Quinone	106-51-4	0.156
Selenium	00-00-0	0.130
Styrene	100-42-5	64.663
Tetrachloroethylene	127-18-4	99.379
Toluene	108-88-3	894.205
Trichloroethylene	79-01-6	47.791
Triethylamine	121-44-8	4.019
Trimethylbenzene	95-63-6	0.050
Vinyl Acetate	108-05-4	1.381
Vinyl Chloride	75-01-3	0.154
Vinylidene Chloride	75-35-4	0.007
Xylene	1330-20-7	377.785
Total of All Hazardous Air Pollutants		**5,388.223 Tons Per Year**

6. FIELD ENFORCEMENT ACTIVITIES

Field enforcement includes two main areas of compliance activities: (1) - Inspection of stationary sources; and (2) - Citizen complaint investigation. All stationary sources are inspected annually. These inspections include a physical tour of the facility, checking of air pollution control equipment, fuel usage, emissions, recordkeeping, and general facility conditions. During 1999 this agency conducted 1,518 inspections of stationary air pollution sources. In addition to the stationary source inspections, there were 345 inspections conducted at asbestos removal sites and 38 indoor air quality inspections. The staff conducted 96 blockage or pressure tests on gasoline dispensing facilities. During 1999 this agency investigated 828 complaints. The field personnel investigate complaints to determine if there is a valid air pollution problem and, if so, appropriate action is taken.

During 1999, this agency issued 21 notices of violation and five (5) consent agreements resulting in the collection of $104,437 in penalties.

7. MONITORING ACTIVITIES

During 1999 this agency operated 11 aerometric stations. Five of these stations are manual, where PM_{10} is measured by operating a selective size inlet sampler (SSI). Total suspended particulate (TSP) sampling was suspended December 31, 1998 due to the standard being revoked by EPA. Beginning January 1, 1999, fine particulate ($PM_{2.5}$) samplers were installed at one existing site (Lockeland School) and at two new sites (Hillwood High School and Wright Middle School). At the Metro Housing Authority site (247-037-0006), PM_{10} was measured daily. This data was used with the continuous monitoring data to calculate the air quality index. This agency also operated three continuous carbon monoxide, two continuous ozone, one continuous sulfur dioxide and one continuous nitrogen oxides/nitrogen dioxide analyzers. All ambient air monitoring is conducted in strict accordance with Federal guidelines. The locations of these aerometric stations are shown in Figure 7 and a listing of the addresses is given in Table IV. A list of the National Ambient Air Quality Standards for all criteria pollutants is presented in Table V. During the pollen season, March through October, this agency operates a Durham sampler measuring pollen. The Durham sampler is located at site 247-037-0006 on the roof of the Metro Housing Authority at 1400 Eighth Avenue North.

The daily air quality index and pollen count is made available to the public by calling (615) 340-0488 and on the Metropolitan Health Department website which can be found at http://healthweb.nashville.org.

Following Table V is a statistical summary of the Ambient Air Quality concentrations measured in Metropolitan Nashville and Davidson County during 1999.

LOCATION OF AIR MONITORING SITES
Figure 7

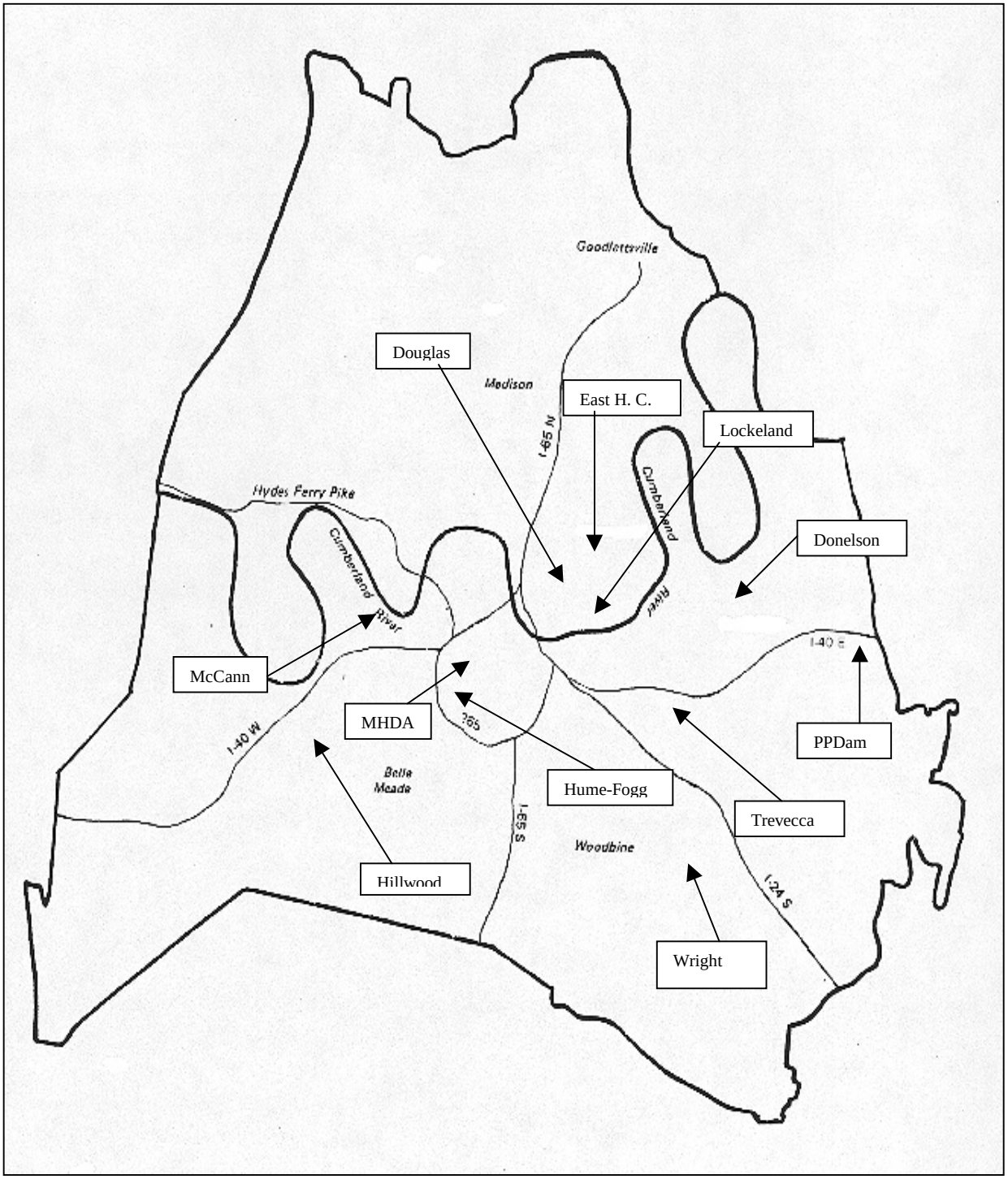


TABLE IV
SITE LOCATION & CLASSIFICATION

Site No.	Address	UTM Coordinates		Land Use	Pollutants Sampled
47-037-0002	Trevecca Nazarene College 333 Murfreesboro Road	522.2	3999.6	CC-C	PM_{10}**
47-037-0006	Metro Housing Authority (MHDA) 1400 Eighth Ave. North	518.6	4003.4	CC-C	PM_{10}*
47-037-0011	East Nashville Health Center 1015 East Trinity Lane	523.0	4006.6	CC-R	SO_2*, NO_2**, Ozone*, PM_{10}**
47-037-0021	Hume-Fogg Magnet School	519.5	4001.5	CC-C	CO*
47-037-0023	Lockeland Middle School 101 South Seventeenth St.	523.5	4003.4	CC-R	PM_{10}**, $PM_{2.5}$**
47-037-0024	McCann School 1300 56th Avenue North	513.1	4001.8	CC-R, I	PM_{10}**
47-037-0025	Wright Middle School 180 McCall Street	524.0	3994.9	S-R	$PM_{2.5}$**
47-037-0026	Percy Priest Dam	534.2	4001.4	Background	Ozone**
47-037-0028	Donelson Library 2315 Lebanon Road	528.7	4002.5	S-C	CO*
47-037-0031	Douglas Park 210 North Seventh St.	521.4	4003.4	CC-R	CO*
47-037-0036	Hillwood High School 400 Davidson Road	511.1	3996.9	S-R	$PM_{2.5}$**

Land Use Terms
CC-Center City I-Industrial
S-Suburban C-Commercial
R-Residential

Monitor Classification
*NAMS-National Air Monitoring Stations
**SLAMS-State/Local Air Monitoring Stations

TABLE V
AMBIENT AIR QUALITY STANDARDS*

CONTAMINANTS	PRIMARY STANDARD			SECONDARY STANDARD		
	CONCENTRATION		AVERAGE	CONCENTRATION		AVERAGE
	$\mu G/M^3$	PPM	INTERVAL	$\mu G/M^3$	PPM	INTERVAL
PM_{10}	50		AAM	50		AAM
	150		24-HR	150		24-HR
$PM_{2.5}$	15		AAM	15		AAM
	65		24-HR	65		24-HR
Sulfur Dioxide	80	0.03	AAM	1,300	0.5	3-HR
	365	0.14	24-HR			
Carbon Monoxide	40,000 10,000	35.0 9.0	1-HR 8-HR	40,000 10,000	35.0 9.0	1-HR 8-HR
Ozone	157	0.08	8-HR	157	0.08	8-HR
Nitrogen Dioxide	100	0.05	AAM	100	0.05	AAM
Lead	1.5		QAM	1.5		QAM

AAM – Annual Arithmetic Mean
AGM – Annual Geometric Mean
QAM – Calendar Arithmetic Mean

*On July 17, 1997, EPA revised the ozone standard by phasing out and replacing the 1-hour standard with an 8-hour standard to protect against longer exposure periods. Subsequently, the

1-hour standard was revoked in many areas across the United States, including Davidson County. Compliance with the new 8-hour ozone standard is attained at each monitoring site if the 3-year average of the annual fourth highest daily maximum is less than or equal to 0.08 ppm. The 8-hour ozone standard has been challenged in federal court, and its future is currently unclear.

*The EPA also revised the primary and secondary particulate matter standards by changing the form of the existing 24-hour and annual particulate matter standards for particles 10 micrometers in diameter or smaller. Compliance with the 24-hour standard is attained when the three-year average of the annual 99^{th} percentile of 24-hour monitored concentration is less than or equal to 150 $\mu g/m^3$. Compliance with the annual standard is attained when the annual arithmetic mean is less than or equal to 50 $\mu g/m^3$.

*The EPA also established 24-hour and annual standards for "fine" particles (particles 2.5 micrometers in diameter or smaller). Compliance with the 24-hour standard is attained when the 3-year average of the annual 98^{th} percentile of 24-hour monitored concentrations is less than or equal to 65 $\mu g/m^3$. Compliance with the annual standard is attained when the 3-year average of the annual arithmetic mean is less than or equal to 15 $\mu g/m^3$.

Ambient monitoring for $PM_{2.5}$ began January 1, 1999. The ambient network was installed and sampling began as planned. However, due to equipment and software problems from the manufacturer, the data collected for most of 1999 is questionable as to its validity. Sampler and software modifications were performed in September, 1999, and we are much more comfortable with the validity of the data generated after that date. Therefore, only the $PM_{2.5}$ data generated beginning October, 1999 are presented in this report. Tables X and XI present the $PM_{2.5}$ data collected from October through December, 1999.

PARTICULATE MATTER

The air pollution called “particulate matter” includes airborne materials such as dust, soot, pollen, aerosols, etc. Particulates range in diameter from 0.005 to 250 microns. There are many sources of particulate matter which includes both natural and anthropogenic.

The particulate National Ambient Air Quality Standard (NAAQS) was revised in 1987 from total suspended particulate (TSP) to PM_{10}. PM_{10} focuses on those particles with aerodynamic diameters smaller than 10 micrometers, which are likely to be responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract. Particulate matter has a negative effect on breathing and respiratory systems. Elderly adults, young children and people with chronic pulmonary, respiratory or cardiovascular disease, or asthma are especially sensitive to the effects of PM_{10}. PM_{10} particulates are measured using a modified high-volume sampler equipped with a selective size inlet. The sampler draws air into a covered housing onto a glass fiber filter by means of a modified vacuum pump which allows a set flow rate of approximately 40 cubic feet per minute. Mass concentration of suspended particulates in the ambient air ($\mu g/m^3$) are computed by measuring the mass particulates collected in the volume of air sampled. For determining the average concentrations of suspended particulates, a 24-hour sampling period is used. After sampling for 24 hours, the filter is removed and returned to the

laboratory where it is allowed to equilibrate and is weighed. All high-volume samplers are operated for the same 24-hour period once every sixth day.

In 1999, the Health Department operated five (5) sites equipped with PM_{10} samplers. Tables VI and VII present a summary of the measured concentrations during 1999. This data shows that the ambient air quality standard for PM_{10} was not exceeded in 1999. Tables VIII and IX and Figures 8 and 9 compare the PM_{10} concentrations for the past nine years. Tables X and XI present the valid 1999 $PM_{2.5}$ data.

TABLE VI
1999 SUMMARY OF PM_{10} ($\mu G/M^3$)

SITE LOCATION	Trevecca	MHDA	East	Lockeland	McCann
Number of Observations	59	297	60	59	59
Maximum 24-Hr Concentration	68	82	52	55	60
Date of Maximum Concentration	8/10	11/12	7/5	7/23	10/27
2nd Maximum 24-Hr Concentration	67	74	45	51	53
Date of 2nd Maximum 24-Hr. Concentration	10/27	10/28	7/23	9/3	9/3
Annual Arithmetic Mean	31	28	24	24	27
Number of Exceedance of 24-Hr Standard	0	0	0	0	0

TABLE VII
1999 QUARTERLY COMPARISON OF PM_{10} ARITHMETIC MEAN ($\mu G/M^3$)

Site Location	1st	2nd	3rd	4th	Annual
Trevecca	20	31	43	30	31
MHDA	20	28	33	29	28
East	18	21	32	23	24
Lockeland	17	20	36	23	24
McCann	18	28	36	26	27

TABLE VIII
1991 - 1999 24-HOUR MAXIMUM PM_{10} CONCENTRATIONS ($\mu G/M^3$)

Site Location	1991	1992	1993	1994	1995	1996	1997	1998	1999
Trevecca	73	61	83	73	69	61	76	70	68
MHDA	104	84	141	82	73	84	74	69	82
East	70	55	57	63	64	64	54	50	52
Lockeland	76	58	72	63	65	55	51	53	55
McCann	76	65	79	85	70	76	65	56	60

TABLE IX
1991 – 1999 ANNUAL AVERAGE PM_{10} CONCENTRATIONS ($\mu G/M^3$)

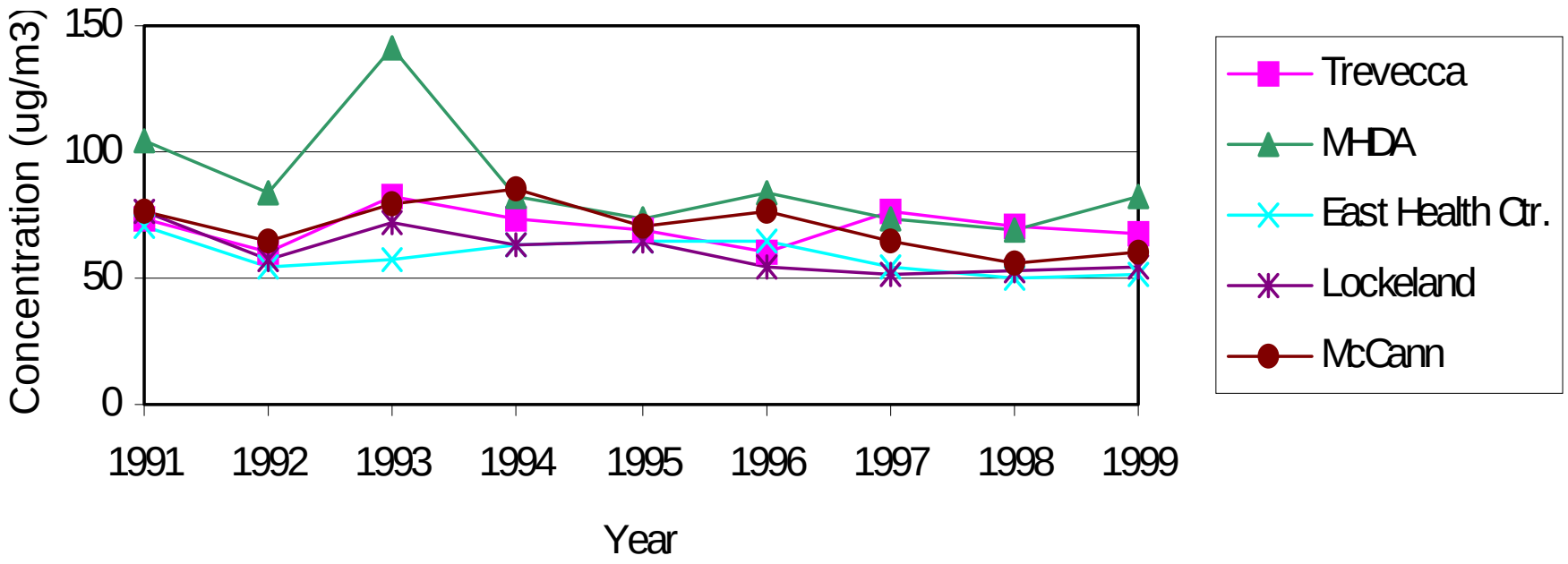
Site Location	1991	1992	1993	1994	1995	1996	1997	1998	1999
Trevecca	35	31	32	32	34	33	34	32	31
MHDA	34	29	32	31	27	28	27	28	28
East	31	30	27	28	27	24	25	25	24
Lockeland	32	28	28	25	27	26	23	25	24
McCann	38	33	36	36	35	30	30	28	27

TABLE X 1999 QUARTERLY COMPARISON OF $PM_{2.5}$ ARITHMETIC MEAN ($\mu G/M^3$)					
Site Location	**1st**	**2nd**	**3rd**	**4th**	**Annual**
Lockeland	*	*	*	15.3	15.3
Wright Middle School	*	*	*	14.5	14.5
Hillwood	*	*	*	13.5	13.5

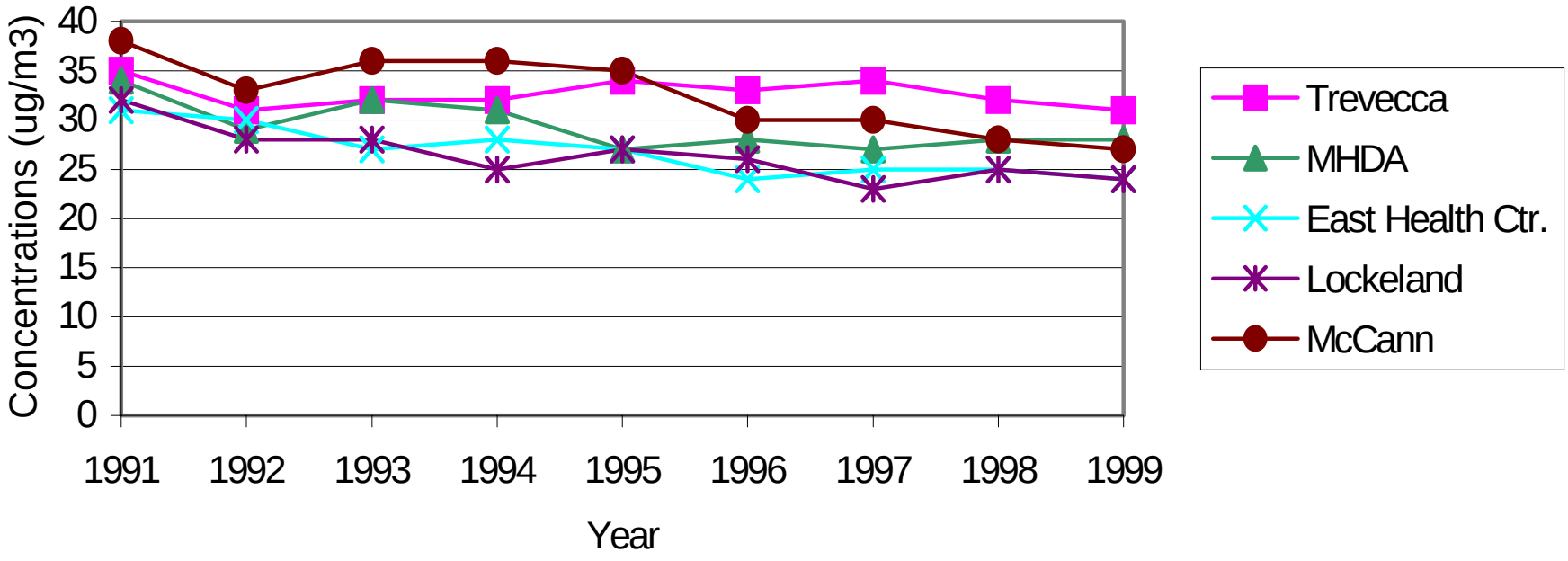
TABLE XI 1999 $PM_{2.5}$ CONCENTRATIONS ($\mu G/M^3$)		
Site Location	**24-HOUR MAXIMUM***	**ANNUAL MEAN***
Lockeland	25.7	15.3
Wright Middle School	24.2	14.5
Hillwood	22.5	13.5

*$PM_{2.5}$ data for the first three quarters of 1999 are considered to be invalid due to equipment design and software problems from the manufacturer.

ANNUAL ARITHMETIC MEAN PM10 (ug/m3)
Maximum 24-Hour Concentrations
Figure 8



ANNUAL ARITHMETIC MEAN PM10 (ug/m3)
Annual Average Concentrations
Figure 9



LEAD

The traditional major sources of ambient lead are from the combustion of leaded gasoline, and the manufacture of lead storage batteries. During 1997, the Metropolitan Health Department operated high-volume samplers at two (2) sites. Samples were taken every 6th day on the same schedule as the PM_{10} samplers. The filters were analyzed for suspended lead. Table XII is a summary of the suspended lead concentrations measured in 1997. This data shows that the Ambient Air Quality Standard of 1.5 $\mu g/m^3$ averaged on a calendar quarter was not exceeded in 1997. The maximum calendar quarter concentration measured over the past six (6) years was 0.10 $\mu g/m^3$. This data indicates that ambient lead concentrations are relatively insignificant. Based on low monitored lead levels and EPA guidance, ambient monitoring for lead was discontinued in Nashville and Davidson County on December 31, 1997.

TABLE XII
1997 QUARTERLY COMPARISON OF LEAD, ARITHMETIC MEAN ($\mu G/M^3$)

SITE NUMBER	1ST	2ND	3RD	4TH	ANNUAL
247-037-0006	0.06	0.06	0.06	0.06	0.06
247-037-0035	0.08	0.07	0.07	0.07	0.07

SULFUR DIOXIDE

Sulfur dioxide is a heavy, pungent, colorless gas that combines easily with water vapor to form sulfuric acid. The major health concerns associated with exposure to sulfur dioxide include effects on breathing, respiratory illness, alterations in the lungs' defenses, and aggravation of existing cardiovascular disease. Sulfur dioxide was measured at East Health Center (site 0011) during 1999. Table XIII presents a summary of this data. The data shows that neither the annual arithmetic mean nor the 3-hour average standards of 0.03 and 0.5 PPM respectively were violated in 1999. The main source of sulfur dioxide in Metropolitan Nashville and Davidson County is from fuel combustion. Sulfur dioxide concentration measurements indicate that ambient sulfur dioxide levels are relatively insignificant.

TABLE XIII
1999 SULFUR DIOXIDE (PPM), SITE 247-037-0011, EAST HEALTH CENTER

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	741	666	730	717	709	715	742	737	716	739	717	742	8671
Arithmetic Mean	0.004	0.005	0.008	0.008	0.002	0.002	0.003	0.005	0.005	0.002	0.002	0.003	0.004
Highest 24-Hr Conc.	0.022	0.015	0.015	0.023	0.007	0.005	0.005	0.011	0.019	0.009	0.008	0.010	0.023
Date of Highest 24-Hr Conc.	1/1	2/18	3/24	4/25	5/27	6/20	7/30	8/3	9/7	10/6	11/17	12/31	4/25
2nd Highest 24-Hr Conc.	0.010	0.014	0.014	0.013	0.007	0.005	0.005	0.010	0.011	0.006	0.005	0.007	0.022
Date of 2nd Highest 24-Hr Conc.	1/29	2/22	3/12	4/13	5/28	6/18	7/13	8/4	9/6	10/1	11/11	12/24	1/1
Highest 3-Hr Conc.	0.052	0.039	0.033	0.055	0.026	0.018	0.017	0.024	0.076	0.029	0.017	0.023	0.076
Date of Highest 3-Hr Conc.	1/1	2/20	3/12	4/25	5/1	6/20	7/7	8/21	9/7	10/6	11/17	12/31	9/7
2nd Highest 3-Hr Conc.	0.029	0.037	0.031	0.039	0.020	0.015	0.017	0.022	0.061	0.014	0.014	0.020	0.061
Date of 2nd Highest 3-Hr Conc.	1/29	2/22	3/8	4/13	5/27	6/16	7/19	8/31	9/2	10/4	11/11	12/18	9/2
Annual or 3-Hr Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0

NITROGEN OXIDE

Air is composed of approximately 78% nitrogen and 21% oxygen. When combustion occurs at high temperatures, such as in automobile engines and in other fossil fuel combustion, nitrogen may combine with oxygen to form several different gaseous compounds collectively known as oxides of nitrogen (NO_x). Of these, nitrogen dioxide (NO_2) and nitric oxide (NO) are the most important from an air pollution standpoint. Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections. Nitrogen dioxide contributes to the formation of ozone through a chemical reaction with volatile organic compounds in the presence of sunlight.

Nitrogen dioxide was measured at East Health Center (site 0011) during 1999. Table XIV presents a summary of this data and shows that the annual arithmetic mean standard of 0.05 PPM for nitrogen dioxide was not violated in 1999.

TABLE XIV
1999 NITROGEN DIOXIDE (PPM), SITE 247-037-0011, EAST HEALTH CENTER

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	741	666	730	716	735	715	740	739	716	738	717	741	8694
Arithmetic Mean	0.005	0.001	0.007	0.013	0.020	0.020	0.020	0.025	0.034	0.031	0.022	0.018	0.018
Highest 24-Hr Conc.	0.012	0.005	0.020	0.027	0.031	0.035	0.029	0.041	0.074	0.067	0.032	0.026	0.074
Date of Highest 24-Hr Conc.	1/20	2/16	3/24	4/19	5/3	6/9	7/28	8/17	9/23	10/6	11/5	12/30	9/23
2nd Highest 24-Hr Conc.	0.010	0.005	0.020	0.025	0.029	0.034	0.028	0.039	0.052	0.063	0.032	0.026	0.067
Date of 2nd Highest 24-Hr Conc.	1/19	2/15	3/17	4/20	5/28	6/10	7/30	8/10	9/30	10/2	11/13	12/31	10/6

OZONE

Ozone (O_3) is an unstable, pungent gas in the stratosphere, about ten miles above the earth, which protects us by shielding us from the sun's ultraviolet rays. Tropospheric ozone at the earth's surface has a different effect. It is an eye, nose and throat irritant. It can lower a person's resistance to infection, cause shortness of breath, and over time could damage the lungs. It is also harmful to plants and animals.

Ozone is not released directly from sources. It is produced by a complex series of chemical reactions called photochemical oxidation involving the reaction of nonmethane hydrocarbons and nitrogen dioxide in the presence of sunlight. Ozone is a seasonal problem occurring normally from April through September when warm, sunny weather is abundant. High ozone levels occur in the afternoon after the temperature has risen and the precursors have had time to react. The major sources of volatile organic compounds includes various types of industrial processes, surface coating, solvent usage, fuel combustion and automobiles. On-road mobile sources produced 68% of the nitrogen dioxide emissions in 1999 with light duty gasoline cars responsible for 31% of the total nitrogen dioxide emissions.

Tables XV and XVI are summaries of the 1-hour ozone concentrations for 1999. The data shows that the old National Ambient Air Quality one-hour standard of 0.12 PPM was exceeded once in 1999. The maximum concentration of 0.129 was measured at Percy Priest Dam (site 0026) on July 27, 1999. Table XIX compares the measured ozone concentration for the past several years.

TABLE XV
1999 OZONE (PPM), DAILY MAXIMUM 1-HOUR VALUES, SITE 247-037-0011, EAST HEALTH CENTER

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	741	668	731	717	738	716	741	739	719	740	716	740	8703
Highest 1-Hr Conc.	0.036	0.040	0.059	0.067	0.095	0.098	0.101	0.107	0.117	0.073	0.062	0.038	0.117
Date of Highest Conc.	1/20	2/16	3/17	4/20	5/29	6/22	7/8	8/17	9/4	10/28	11/9	12/5	9/4
2nd Highest 1-Hr Conc.	0.026	0.038	0.053	0.063	0.076	0.097	0.098	0.097	0.116	0.072	0.056	0.037	0.116
Date of 2nd Highest Conc.	1/13	2/25	3/5	4/3	5/28	6/4	7/23	8/6	9/5	10/29	11/14	12/4	9/5
3rd Highest 1-Hr Conc.	0.026	0.036	0.052	0.063	0.074	0.096	0.094	0.096	0.099	0.071	0.054	0.037	0.107
Date of 3rd Highest Conc.	1/18	2/15	3/28	4/7	5/11	6/8	7/25	8/16	9/8	10/2	11/13	12/31	8/17
4th Highest 1-Hr Conc.	0.025	0.035	0.052	0.061	0.073	0.090	0.088	0.095	0.093	0.065	0.051	0.034	0.101
Date of 4th Highest Conc.	1/12	2/22	3/30	4/19	5/4	6/20	7/27	8/19	9/2	10/7	11/10	12/17	7/8
No. of 1-Hr Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 1-Hr Concentrations													
0.000 - 0.044	741	668	690	603	533	515	550	471	539	671	682	740	7403
0.045 - 0.084	0	0	41	114	199	181	182	239	147	69	34	0	1206
0.085 - 0.124	0	0	0	0	6	20	9	29	30	0	0	0	94
0.125 - 0.164	0	0	0	0	0	0	0	0	0	0	0	0	0
0.165 - 0.204	0	0	0	0	0	0	0	0	0	0	0	0	0
0.205 - 0.404	0	0	0	0	0	0	0	0	0	0	0	0	0
0.405 - 0.504	0	0	0	0	0	0	0	0	0	0	0	0	0
0.505 - 0.604	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE XVI
1999 OZONE (PPM), DAILY MAXIMUM 1-HOUR VALUES, SITE 247-037-0026, PERCY PRIEST DAM

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	742	668	735	719	738	717	741	721	713	741	717	741	8693
Highest 1-Hr Conc.	0.059	0.048	0.074	0.076	0.092	0.105	0.129	0.123	0.112	0.085	0.069	0.045	0.129
Date of Highest Conc.	1/20	2/16	3/17	4/20	5/29	6/8	7/27	8/12	9/4	10/28	11/9	12/4	7/27
2nd Highest 1-Hr Conc.	0.053	0.045	0.067	0.074	0.082	0.096	0.118	0.120	0.112	0.080	0.059	0.043	0.123
Date of 2nd Highest Conc.	1/26	2/15	3/2	4/7	5/4	6/7	7/23	8/17	9/5	10/29	11/13	12/5	8/12
3rd Highest 1-Hr Conc.	0.048	0.044	0.065	0.072	0.079	0.096	0.095	0.111	0.109	0.075	0.058	0.043	0.120
Date of 3rd Highest Conc.	1/27	2/8	3/30	4/3	5/11	6/22	7/19	8/10	9/8	10/2	11/5	12/31	8/17
4th Highest 1-Hr Conc.	0.043	0.044	0.064	0.071	0.079	0.092	0.090	0.107	0.102	0.072	0.056	0.041	0.118
Date of 4th Highest Conc.	1/17	2/26	3/23	4/19	5/21	6/4	7/30	8/4	9/1	10/7	11/18	12/2	7/23
No. of 1-Hr Exceedances	0	0	0	0	0	0	1	0	0	0	0	0	1
No. of 1-Hr Concentrations													
0.000 - 0.044	726	663	650	514	441	450	487	415	483	619	639	739	6826
0.045 - 0.084	16	5	85	205	293	236	231	255	195	121	78	2	1722
0.085 - 0.124	0	0	0	0	4	31	22	51	35	1	0	0	144
0.125 - 0.164	0	0	0	0	0	0	1	0	0	0	0	0	1
0.165 - 0.204	0	0	0	0	0	0	0	0	0	0	0	0	0
0.205 - 0.404	0	0	0	0	0	0	0	0	0	0	0	0	0
0.405 - 0.504	0	0	0	0	0	0	0	0	0	0	0	0	0
0.505 - 0.604	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE XVII
1999 OZONE (PPM), DAILY MAX. 8-HOUR AVG. VALUES, SITE 247-037-0011, EAST HEALTH CENTER

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	744	672	744	720	738	716	744	738	714	744	720	744	8738
Highest 8-Hr Avg. Conc.	0.024	0.033	0.056	0.058	0.088	0.086	0.085	0.090	0.103	0.064	0.048	0.036	0.103
Date of Highest Conc.	1/20	2/16	3/17	4/20	5/29	6/4	7/8	8/17	9/4	10/2	11/14	12/4	9/4
2nd Highest 8-Hr Avg. Conc.	0.023	0.032	0.045	0.057	0.069	0.085	0.082	0.085	0.102	0.053	0.046	0.036	0.102
Date of 2nd Highest Conc.	1/12	2/25	3/30	4/30	5/11	6/22	7/23	8/10	9/5	10/7	11/9	12/5	9/5
3rd Highest 8-Hr Avg. Conc.	0.020	0.031	0.044	0.055	0.067	0.084	0.072	0.085	0.082	0.053	0.044	0.026	0.090
Date of 3rd Highest Conc.	1/9	2/22	3/29	4/7	5/4	6/20	7/25	8/19	9/6	10/29	11/10	12/17	8/17
4th Highest 8-Hr Avg. Conc.	0.020	0.030	0.043	0.052	0.067	0.079	0.069	0.084	0.078	0.049	0.041	0.025	0.088
Date of 4th Highest Conc.	1/13	2/12	3/27	4/3	5/28	6/21	7/22	8/6	9/8	10/11	11/5	12/3	5/29
No. of 8-Hr Exceedances	0	0	0	0	1	2	1	3	2	0	0	0	9
No. of 1-Hr Concentrations													
0.000 - 0.064	744	672	744	720	719	676	720	682	663	744	750	744	8548
0.065 - 0.084	0	0	0	0	16	37	23	51	39	0	0	0	166
0.085 - 0.104	0	0	0	0	3	3	1	5	12	0	0	0	24
0.105 - 0.124	0	0	0	0	0	0	0	0	0	0	0	0	0
0.125 - 0.374	0	0	0	0	0	0	0	0	0	0	0	0	0
Greater Than 0.374	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE XVIII
1999 OZONE (PPM), DAILY MAX. 8-HOUR AVG. VALUES, SITE 247-037-0026, PERCY PRIEST LAKE

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	744	672	744	720	738	720	744	721	720	744	720	744	8731
Highest 8-Hr Avg. Conc.	0.051	0.043	0.069	0.069	0.083	0.093	0.101	0.098	0.100	0.073	0.059	0.042	0.101
Date of Highest Conc.	1/20	2/16	3/17	4/7	5/29	6/8	7/27	8/17	9/4	10/29	11/9	12/5	7/27
2nd Highest 8-Hr Avg. Conc.	0.045	0.040	0.058	0.069	0.078	0.086	0.092	0.094	0.098	0.069	0.051	0.041	0.100
Date of 2nd Highest Conc.	1/27	2/26	3/30	4/20	5/4	6/7	7/23	8/12	9/5	10/7	11/5	12/4	9/4
3rd Highest 8-Hr Avg. Conc.	0.039	0.039	0.056	0.062	0.074	0.084	0.077	0.088	0.089	0.062	0.050	0.034	0.098
Date of 3rd Highest Conc.	1/26	2/15	3/2	4/19	5/21	6/22	7/30	8/10	9/1	10/2	11/10	12/9	8/17
4th Highest 8-Hr Avg. Conc.	0.037	0.039	0.056	0.062	0.074	0.084	0.077	0.088	0.089	0.062	0.050	0.034	0.098
Date of 4th Highest Conc.	1/12	2/22	3/31	4/3	5/11	6/21	7/22	8/6	9/8	10/28	11/13	12/3	9/5
No. of 8-Hr Exceedances	0	0	0	0	0	3	2	6	4	0	0	0	15
No. of 1-Hr Concentrations													
0.000 - 0.064	744	672	739	708	687	646	666	624	645	732	720	744	8327
0.065 - 0.084	0	0	5	12	51	67	67	80	57	12	0	0	351
0.085 - 0.104	0	0	0	0	0	7	11	17	18	0	0	0	53
0.105 - 0.124	0	0	0	0	0	0	0	0	0	0	0	0	0
0.125 - 0.374	0	0	0	0	0	0	0	0	0	0	0	0	0
Greater Than 0.374	0	0	0	0	0	0	0	0	0	0	0	0	0

Tables XVII and XVIII are summaries of the 8-hour average ozone concentrations for 1999. The data shows that the new National Ambient Air Quality 8-hour average standard of 0.08 PPM was exceeded on 19 days in 1999. The maximum concentration of 0.103 was measured at East Health Center (site 0011) on September 4, 1999. Table XX compares the 1-hour daily maximum ozone concentrations from 1980 through 1999 at East Health Center and Percy Priest Dam. Table XX compares the measured 8-hour ozone concentrations for the past three years.

TABLE XIX

1980 - 1999 ANNUAL COMPARISON 1-HOUR OZONE CONCENTRATIONS (PPM)

SITE 247-037-0011 EAST HEALTH CENTER

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hr. Conc.	0.130	0.095	0.110	0.135	0.120	0.090	0.105	0.105	0.145	0.100	0.110	0.095	0.090	0.105	0.090	0.110	0.100	0.130	0.114	0.117
2nd Highest 1-Hr. Conc.	0.130	0.095	0.105	0.120	0.100	0.085	0.095	0.090	0.130	0.095	0.105	0.075	0.080	0.100	0.090	0.105	0.100	0.125	0.105	0.116
3rd Highest 1-Hr. Conc.	0.130	0.090	0.105	0.115	0.085	0.080	0.085	0.090	0.125	0.090	0.100	0.075	0.080	0.100	0.090	0.100	0.095	0.110	0.102	0.107
4th Highest 1-Hr. Conc.	0.130	0.090	0.095	0.115	0.085	0.080	0.080	0.090	0.120	0.085	0.095	0.070	0.075	0.090	0.090	0.100	0.095	0.110	0.101	0.101
No. of 1-Hr. Exceedances	5	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0
No. of Days Std. Exceeded	4	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0

SITE 247-037-0026 PERCY PRIEST LAKE

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hr. Conc.	0.100	0.085	0.070	0.095	0.115	0.075	0.085	0.115	0.130	0.085	0.115	0.105	0.105	0.100	0.105	0.115	0.125	0.120	0.141	0.129
2nd Highest 1-Hr. Conc.	0.090	0.075	0.065	0.090	0.100	0.075	0.085	0.095	0.130	0.080	0.100	0.095	0.095	0.090	0.095	0.110	0.110	0.100	0.120	0.123
3rd Highest 1-Hr. Conc.	0.090	0.065	0.060	0.090	0.085	0.070	0.085	0.095	0.125	0.080	0.095	0.095	0.080	0.090	0.080	0.110	0.105	0.095	0.112	0.120
4th Highest 1-Hr. Conc.	0.090	0.065	0.055	0.090	0.080	0.070	0.080	0.090	0.120	0.075	0.085	0.095	0.080	0.090	0.080	0.110	0.100	0.095	0.111	0.118
No. of 1-Hr. Exceedances	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	3	1
No. of Days Std. Exceeded	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	1	1

TABLE XX 1997 – 1999 ANNUAL COMPARISON 8-HOUR OZONE CONCENTRATIONS (PPM)			
SITE 247-037-0011 EAST HEALTH CENTER			
YEAR	1997	1998	1999
Highest 8-hour average concentration	0.104	0.095	0.103
2nd highest 8-hour average concentration	0.098	0.092	0.102
3rd highest 8-hour average concentration	0.098	0.092	0.090
4th highest 8-hour average concentration	0.097	0.089	0.088
No. of days 8-hour standard exceeded	8	4	9
SITE 247-037-0026 PERCY PRIEST LAKE			
YEAR	1997	1998	1999
Highest 8-hour average concentration	0.102	0.107	0.101
2nd highest 8-hour average concentration	0.087	0.100	0.100
3rd highest 8-hour average concentration	0.087	0.093	0.098
4th highest 8-hour average concentration	0.086	0.091	0.098
No. of days 8-hour standard exceeded	4	12	15

The Middle Tennessee area, which includes Davidson, Sumner, Rutherford, Williamson, and Wilson Counties, was reclassified to attainment for the 1-hour ozone NAAQS on October 30, 1996.

Table XXI shows that over the three-year period of 1997 through 1999, only one of the ozone monitors in the Middle Tennessee area (site 247-165-0007 Old Hickory Dam, Sumner County) measured a violation of the old 1-hour National Ambient Air Quality Standard (NAAQS) by measuring more than one (1.0) exceedance per year on the average. However, all Middle Tennessee monitors showed a violation of the more stringent 8-hour average NAAQS by the average of the fourth highest value over the 3-year period being greater than 0.084 ppm.

TABLE XXI
1997 – 1999 SUMMARY OF 1-HOUR AND 8-HOUR MAXIMUM OZONE CONCENTRATIONS IN THE MIDDLE TENNESSEE AREA

SITE NUMBER	YEAR	MAXIMUM CONCENTRATIONS								NO. OF EXCEEDANCES	
		1st 1-Hr.	1st 8-Hr.	2nd 1-Hr.	2nd 8-Hr.	3rd 1-Hr.	3rd 8-Hr.	4th 1-Hr.	4th 8-Hr.	1-Hr.	8-Hr.
247-037-0011	1997	0.130	0.104	0.125	0.098	0.110	0.098	0.110	0.097	2	8
	1998	0.114	0.095	0.105	0.092	0.102	0.092	0.101	0.089	0	4
	1999	0.117	0.103	0.116	0.102	0.107	0.090	0.101	0.088	0	9
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**0.67**	**7.0**
247-037-0026	1997	0.120	0.100	0.100	0.083	0.095	0.082	0.095	0.082	0	1
	1998	0.141	0.107	0.120	0.100	0.112	0.093	0.111	0.091	1	12
	1999	0.129	0.101	0.123	0.100	0.120	0.098	0.118	0.098	1	15
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**0.67**	**9.33**
247-149-0101*	1997	0.105	0.097	0.101	0.092	0.099	0.089	0.095	0.087	0	6
	1998	0.104	0.094	0.104	0.089	0.099	0.088	0.099	0.087	0	4
	1999	0.116	0.105	0.116	0.102	0.111	0.100	0.106	0.096	0	11
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**0**	**7.0**
247-165-0007*	1997	0.139	0.110	0.127	0.110	0.122	0.102	0.118	0.100	2	14
	1998	0.134	0.111	0.127	0.109	0.126	0.107	0.123	0.107	3	27
	1999	0.132	0.110	0.123	0.109	0.119	0.101	0.119	0.101	1	28
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**2.0**	**23.0**
247-165-0101*	1997	0.121	0.103	0.112	0.102	0.110	0.095	0.107	0.092	0	6
	1998	0.115	0.092	0.114	0.091	0.104	0.090	0.103	0.088	0	4
	1999	0.120	0.105	0.114	0.098	0.113	0.096	0.111	0.095	0	11
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**0**	**7.0**
247-187-0103*	1997	0.111	0.095	0.110	0.095	0.108	0.093	0.106	0.092	0	12
	1998	0.114	0.110	0.114	0.106	0.114	0.100	0.110	0.096	0	12
	1999	0.121	0.103	0.114	0.103	0.109	0.103	0.106	0.097	0	15
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**0**	**13.0**
247-189-0103*	1997	0.106	0.097	0.104	0.089	0.103	0.086	0.103	0.084	0	3
	1998	0.105	0.095	0.105	0.087	0.099	0.087	0.098	0.085	0	4
	1999	0.141	0.119	0.119	0.099	0.110	0.095	0.109	0.094	1	15
AVERAGE NUMBER OF EXCEEDANCES PER YEAR										**0.33**	**7.33**

247-037-0011 East Health Center, Davidson County
247-037-0026 Percy Priest Lake, Davidson County
247-149-0101* Eagleville, Rutherford County
247-165-0007* Old Hickory Dam, Sumner County
247-165-0101* Cottontown, Sumner County
247-187-0103* Fairview, Williamson County
247-189-0103* Cedars of Lebanon, Wilson County

*OPERATED BY THE STATE OF TENNESSEE--DIVISION OF AIR POLLUTION CONTROL

CARBON MONOXIDE

Carbon monoxide is a colorless, odorless gas that is a product of incomplete combustion. The major source of carbon monoxide is the internal combustion engine, particularly the automobile. Carbon monoxide enters the bloodstream and reduces oxygen delivery to the body's organs and tissues. The method used for measuring carbon monoxide is a non-dispersive infrared method. During 1999 carbon monoxide was measured at three sites: one in the downtown area, Hume Fogg Magnet School (site 0021); one in an urbanized neighborhood, Douglas Park (site 0031); and one in a suburban neighborhood, Donelson Library (site 0028). Tables XXII through XXVIII present a summary of the carbon monoxide data for 1999. This data shows that the National Ambient Air Quality Standard was not violated at any site during 1999.

TABLE XXII
1999 CARBON MONOXIDE (PPM), SITE 247-037-0021, HUME FOGG MAGNET SCHOOL

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	742	671	740	710	736	717	743	743	718	742	719	737	8718
Highest 1-Hr Conc.	7.9	4.8	4.0	7.5	3.0	2.8	4.2	3.4	5.3	5.2	7.1	5.1	7.9
Date of Highest Conc.	1/13	2/5	3/16	4/7	5/12	6/8	7/4	8/12	9/24	10/1	11/27	12/31	1/13
2nd Highest 1-Hr Cond.	7.6	3.5	3.7	7.2	3.0	2.7	3.2	3.2	4.5	4.4	5.6	4.8	7.6
Date of 2nd Highest 1-Hr Conc.	1/14	2/9	3/24	4/7	5/13	6/8	7/17	8/11	9/25	10/28	11/27	12/30	1/14
No. of 1-Hr Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest 8-Hr Conc.	3.4	2.3	2.7	6.2	2.3	2.2	2.7	2.4	3.2	3.6	4.0	3.6	6.2
Date of Highest 8-Hr Conc.	1/14	2/9	3/24	4/8	5/15	6/20	7/5	8/12	9/25	10/2	11/13	12/31	4/8
2nd Highest 8-Hr Conc.	3.3	2.1	2.6	5.2	1.9	2.0	2.4	2.3	3.1	3.2	4.0	3.5	5.2
Date of 2nd Highest Conc.	1/13	2/5	3/16	4/7	5/7	6/24	7/4	8/11	9/26	10/3	11/28	12/18	4/7
No. of 8-Hr Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 8-Hr Concentration													
0 - 4.9	744	672	744	700	731	720	744	744	720	744	720	731	8714
5.0 - 8.9	0	0	0	9	0	0	0	0	0	0	0	0	9
9.0 - 12.9	0	0	0	0	0	0	0	0	0	0	0	0	0
13.0 - 16.9	0	0	0	0	0	0	0	0	0	0	0	0	0
17.0 - 20.9	0	0	0	0	0	0	0	0	0	0	0	0	0
21.0 - 24.9	0	0	0	0	0	0	0	0	0	0	0	0	0
25.0 - 28.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greater Than 28.0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE XXIII
1999 CARBON MONOXIDE (PPM), SITE 247-037-0028, DONELSON LIBRARY

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	742	641	742	719	723	714	720	742	717	741	719	742	8662
Highest 1-Hr Conc.	2.9	1.8	2.6	2.2	2.0	1.3	1.3	1.2	3.0	2.7	4.1	3.3	4.1
Date of Highest Conc.	1/25	2/25	3/29	4/2	5/15	6/5	7/6	8/17	9/24	10/27	11/18	12/8	11/18
2nd Highest 1-Hr. Conc.	2.8	1.3	2.5	1.7	1.9	1.3	1.2	1.1	3.0	2.4	4.0	2.3	4.0
Date of 2nd Highest 1-Hr Conc.	1/25	2/3	3/29	4/5	5/15	6/9	7/24	8/17	9/24	10/27	11/18	12/6	11/18
No. of 1-Hr Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest 8-Hr. Conc.	2.2	0.7	1.9	1.4	1.6	1.1	1.0	0.8	2.6	1.7	3.6	1.9	3.6
Date of Highest 8-Hr Conc.	1/11	2/3	3/30	4/5	5/15	6/10	7/25	8/19	9/24	10/17	11/18	12/7	11/18
2nd Highest 8-Hr. Conc.	2.0	0.7	1.6	1.2	1.2	1.0	0.9	0.7	1.3	1.7	2.3	1.7	2.6
Date of 2nd Highest 8-Hr. Conc.	1/10	2/13	3/29	4/2	5/5	6/9	7/6	8/11	9/23	10/27	11/8	12/6	9/24
No. of 8-Hr Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 8-Hr Concentration													
0-4.9	744	640	744	720	723	720	714	744	720	744	720	744	8677
5.0-8.9	0	0	0	0	0	0	0	0	0	0	0	0	0
9.0-12.9	0	0	0	0	0	0	0	0	0	0	0	0	0
13.0-16.9	0	0	0	0	0	0	0	0	0	0	0	0	0
17.0-20.9	0	0	0	0	0	0	0	0	0	0	0	0	0
21.0-24.9	0	0	0	0	0	0	0	0	0	0	0	0	0
25.0-28.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greater Than 28.0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE XXIV
1999 CARBON MONOXIDE (PPM), SITE 247-037-0031, DOUGLAS PARK

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
No. of Observations	742	668	740	719	740	717	738	742	719	741	719	738	8723
Highest 1-Hr Conc.	5.6	5.8	5.3	4.9	5.0	3.3	3.4	3.1	7.0	6.6	6.4	7.5	7.5
Date of Highest Conc.	1/26	2/5	3/1	4/7	5/14	6/7	7/16	8/3	9/24	10/26	11/3	12/31	12/31
2nd Highest 1-Hr. Conc.	5.4	5.5	5.3	4.7	4.7	3.2	3.3	3.1	5.8	6.5	6.4	7.2	7.2
Date of 2nd Highest 1-Hr. Conc.	1/15	2/9	3/24	4/7	5/14	6/7	7/14	8/6	9/24	10/25	11/8	2/31	12/31
No. of 1-Hr. Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest 8-Hr. Conc.	3.8	4.1	4.2	3.8	3.5	2.1	2.7	2.7	4.8	5.6	5.3	5.3	5.6
Date of Highest 8-Hr. Conc.	1/17	2/6	3/16	4/8	5/15	6/8	7/17	8/7	9/25	10/27	11/4	12/31	10/27
2nd Highest 8-Hr. Conc.	3.4	4.0	3.9	2.9	3.1	1.7	2.2	2.1	4.1	5.1	5.3	5.2	5.3
Date of 2nd Highest 8-Hr. Conc.	1/19	2/10	3/2	4/3	5/14	6/7	7/15	8/8	9/19	10/26	11/13	12/23	11/4
No. of 8-Hr Exceedance	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 8-Hr Conc.													
0 - 4.9	744	672	744	720	744	720	736	744	720	739	712	733	8728
5.0 - 8.9	0	0	0	0	0	0	0	0	0	5	8	4	17
9.0 - 12.9	0	0	0	0	0	0	0	0	0	0	0	0	0
13.0 - 16.9	0	0	0	0	0	0	0	0	0	0	0	0	0
17.0 - 20.9	0	0	0	0	0	0	0	0	0	0	0	0	0
21.0 - 24.9	0	0	0	0	0	0	0	0	0	0	0	0	0
25.0 - 28.0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greater Than 28.0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE XXV
1999 SUMMARY OF CARBON MONOXIDE CONCENTRATIONS (PPM)

SITE	247-037-0021	247-037-0028	247-037-0031	ANNUAL
Highest 1-Hr Conc.	7.9	4.1	7.5	7.9
2nd Highest 1-Hr Conc.	7.6	4.0	7.2	7.6
Highest 8-Hr Conc.	6.2	3.6	5.6	6.2
2nd Highest 8-Hr Conc.	5.2	2.6	5.3	5.3
No. of 1-Hr Exceedances	0	0	0	0
No. of 8-Hr Exceedances	0	0	0	0
No. of Days 8-Hr Exceedances	0	0	0	0

SITE 247-037-0021 HUME FOGG MAGNET SCHOOL
247-037-0028 DONELSON LIBRARY, 2315 LEBANON ROAD
247-037-0031 DOUGLAS PARK, 210 NORTH SEVENTH STREET

Tables XXVI, XXVII and XXVIII, and Figures 10 and 11, show a comparison of the concentrations of carbon monoxide over the past several years. This data shows that the National Ambient Air Quality 8-hour Standard of 9.0 PPM has not been exceeded since 1986.

TABLE XXVI
1980 – 1999 ANNUAL COMPARISON CARBON MONOXIDE CONCENTRATIONS, (PPM)
SITE 247-037-0021 HUME FOGG MAGNET SCHOOL

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hr Conc.	16.5	16.5	23.0	17.0	19.5	16.0	15.0	14.0	12.5	11.0	9.5	7.5	8.5	11.0	9.0	7.5	6.0	7.5	6.9	7.9
2nd Highest 1-Hr Conc.	14.0	16.0	22.5	16.5	17.0	14.0	15.0	12.0	11.0	11.0	8.0	7.5	8.0	8.5	9.0	7.0	5.5	7.0	5.8	7.6
Highest 8-Hr Conc.	9.3	12.9	17.9	11.6	10.8	8.9	9.9	9.3	8.0	8.8	7.8	5.3	6.3	7.0	6.3	6.5	4.4	5.8	4.9	6.2
2nd Highest 8-Hr Conc.	8.9	10.3	15.6	10.8	10.1	7.8	9.5	8.2	7.8	7.6	5.8	4.9	5.8	8.5	5.4	4.8	4.1	5.1	4.6	5.2
No. of 1-Hr Exceedances of the Standard (35PPM)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 8-Hr Exceedances of the Standard (9PPM)	1	4	6	20	8	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
No. of Days 8-Hr. Standard Exceeded (Standard = 9PPM)	1	3	5	20	8	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0

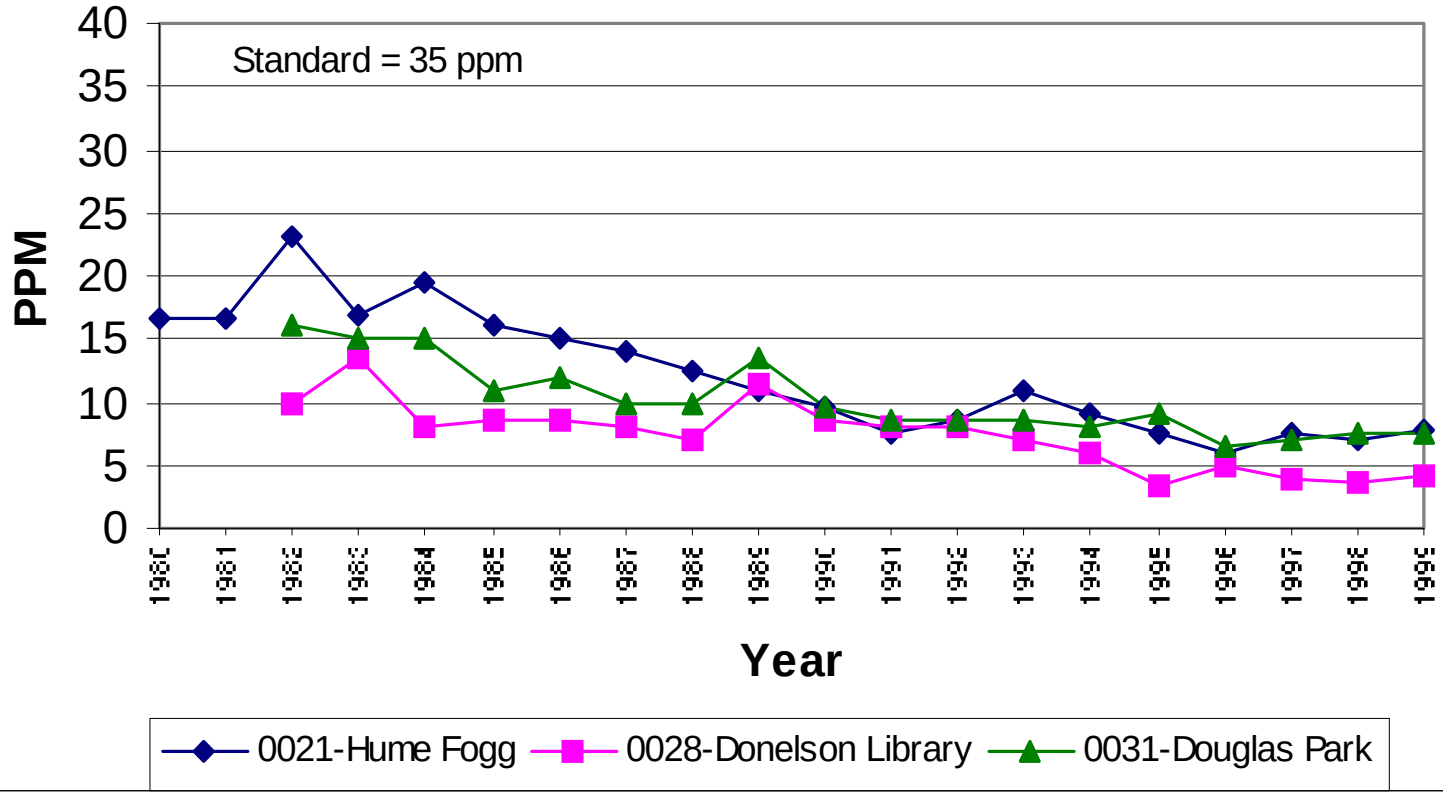
TABLE XXVII
1982 - 1999 ANNUAL COMPARISON OF CARBON MONOXIDE CONCENTRATIONS, (PPM)
SITE 247-037-0028 DONELSON LIBRARY

YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hr Conc.	10.0	13.5	8.0	8.5	8.5	8.0	7.0	11.5	8.5	8.0	8.0	7.0	6.0	3.5	5.0	4.0	3.6	4.1
2nd Highest 1-Hr Conc.	9.5	8.0	7.5	7.0	6.5	8.0	7.0	7.0	7.5	6.5	7.0	6.8	5.5	3.0	4.5	4.0	3.4	4.0
Highest 8-Hr Conc.	6.1	9.5	6.6	4.1	6.3	4.4	6.1	5.6	5.6	5.5	4.4	5.8	4.1	2.8	2.7	2.9	3.1	3.6
2nd Highest 8-Hr Conc.	5.9	4.9	6.2	3.8	5.8	4.1	4.5	5.6	4.3	3.4	4.4	5.4	3.1	2.4	2.5	2.8	2.8	2.6
No. of 1-Hr Exceedances of the Standard (35PPM)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 8-Hr Exceedances of the Standard (9PPM)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of Days 8-Hr. Standard Exceeded (Standard = 9PPM)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

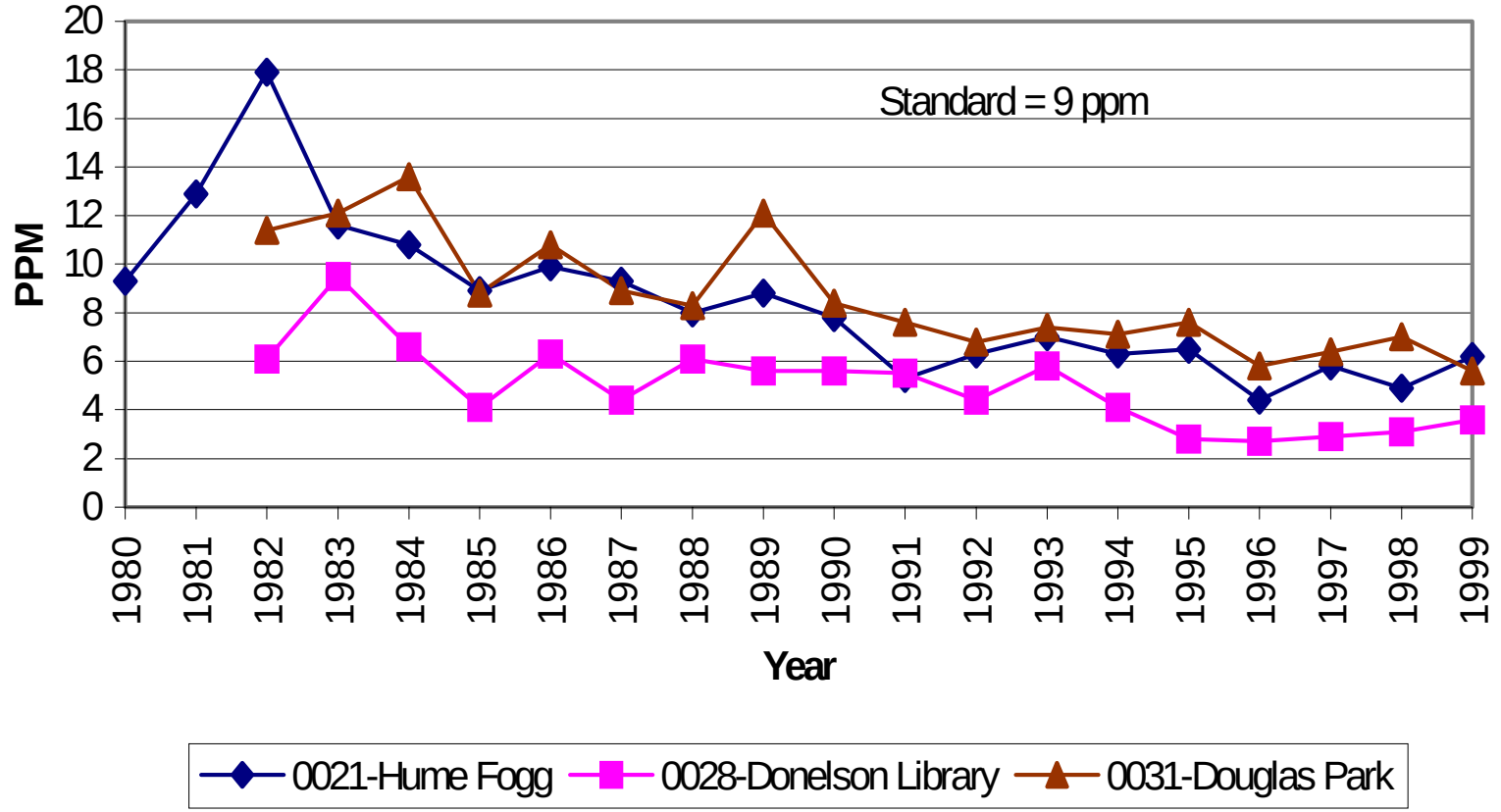
TABLE XXVIII
1982 - 1999 ANNUAL COMPARISON OF CARBON MONOXIDE CONCENTRATIONS, (PPM)
SITE 247-037-0031 DOUGLAS PARK

YEAR	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Highest 1-Hr Concentration	16.0	15.0	15.0	11.0	12.0	10.0	10.0	13.5	9.5	8.5	8.5	8.5	8.0	9.0	6.5	7.0	7.5	7.5
2nd Highest 1-Hr Concentration	12.5	13.5	15.0	10.0	12.0	9.0	9.5	12.5	9.0	8.5	8.0	8.5	8.0	8.5	6.0	7.0	7.2	7.2
Highest 8-Hr Concentration	11.4	12.1	13.6	8.8	10.8	8.9	8.3	12.1	8.4	7.6	6.8	7.4	7.1	7.6	5.8	6.4	7.0	5.6
2nd Highest 8-Hr Concentration	10.6	10.7	13.3	7.1	10.2	8.1	7.0	8.3	7.7	6.2	6.4	7.3	7.1	7.3	5.0	6.3	6.1	5.3
No. of 1-Hr Exceedances of the Standard (35PPM)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of 8-Hr Exceedances of the Standard (9PPM)	5	7	17	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0
No. of Days 8-Hr. Standard Exceeded (Standard = 9PPM)	5	6	16	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0

ANNUAL COMPARISON CARBON MONOXIDE CONCENTRATIONS (PPM)
Highest 1-Hour Concentrations
Figure 10



ANNUAL COMPARISON OF CARBON MONOXIDE CONCENTRATIONS (PPM)
Highest 8-Hour Average Concentrations
Figure 11



AIR QUALITY INDEX

The Air Quality Index (AQI) was developed by the Environmental Protection Agency (EPA) to provide accurate, timely, and easily understandable information about daily levels of air pollution. The AQI converts the measured pollutant concentration to a number on a scale of 0 to 500 with critical breakpoints in between representing ranges of air pollution. The AQI provides general information to the public about air quality and associated health effects. Another purpose of the AQI is to maintain a standardized air quality reporting method across the country.

The daily air quality index and pollen count is made available to the public by calling (615) 340-0488 and on the Metropolitan Health Department website which can be found at http://healthweb.nashville.org. The AQI incorporates the measured concentrations of five pollutants: carbon monoxide, ozone, sulfur dioxide, particulate matter and nitrogen dioxide. It is furnished daily, Monday through Friday, by 10:00 a.m. Included in the numerical value is a descriptive word and cautionary statement, when applicable. Table XXIX shows a comparison of the Air Quality Index descriptive words along with the general health effects and cautionary statements.

The maximum Air Quality Index in 1999 was on August 19, 1999 when it reached 84 due to ozone. During 1999, the Air Quality Index was in the moderate range 63 days or 25% of the time, and in the good range 191 days or 75% of the time.

TABLE XXIX
AQI CAUTIONARY STATEMENTS

AQI Category	Ozone (ppm)		Particulate Matter ($\mu g/m^3$)		Carbon Monoxide (ppm)	Sulfur Dioxide (ppm)	Nitrogen Dioxide (ppm)
	8-Hour	1-Hour	$PM_{2.5}$ 24-Hour	PM_{10} 24-Hour	8-Hour	24-Hour	1-Hour
Good	None		None	None	None	None	None
Moderate	Unusually sensitive people should consider limiting prolonged outdoor exertion.		None	None	None	None	None
Unhealthy for Sensitive Groups	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.	Active children and adults, and people with respiratory disease, such as asthma, should limit heavy outdoor exertion.	People with respiratory or heart disease, the elderly and children should limit prolonged exertion.	People with respiratory disease, such as asthma, should limit outdoor exertion.	People with cardiovascular disease, such as angina, should limit heavy exertion and avoid sources of CO, such as heavy traffic.	People with asthma should consider limiting outdoor exertion.	None
Unhealthy	Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.	Active children and adults, and people with respiratory disease, such as asthma, should avoid heavy outdoor exertion; everyone else, especially children, should limit heavy outdoor exertion.	People with respiratory or heart disease, the elderly and children should avoid prolonged exertion; everyone else should limit prolonged exertion.		People with cardiovascular disease, such as angina, should limit moderate exertion and avoid sources of CO such as heavy traffic.	Children, asthmatics, and people with heart or lung disease should limit outdoor exertion.	None
Very Unhealthy	Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.	Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.	People with respiratory or heart disease, the elderly and children should avoid any outdoor activity; everyone else should avoid prolonged exertion.	People with respiratory disease, such as asthma, should avoid any outdoor activity; everyone else, especially the elderly and children, should limit outdoor exertion.	People with cardiovascular disease, such as angina, should avoid exertion and sources of CO, such as heavy traffic.	Children, asthmatics, and people with heart or lung disease should avoid outdoor exertion; everyone else should limit outdoor exertion.	Children and people with respiratory disease, such as asthma, should limit heavy outdoor exertion.
Hazardous	Everyone should avoid all outdoor exertion.	Everyone should avoid all outdoor exertion.	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.	Everyone should avoid any outdoor exertion; people with respiratory disease, such as asthma, should remain indoors.	People with cardiovascular disease, such as angina, should avoid exertion and sources of CO, such as heavy traffic; everyone else should limit heavy exertion.	Children, asthmatics, and people with heart or lung disease should remain indoors; everyone else should avoid outdoor exertion.	Children, and people with respiratory disease, such as asthma, should limit moderate or heavy outdoor exertion.

POLLEN

Pollen is a small, spherical shaped grain which is produced by plants and is necessary for plant fertilization. Each plant has its own pollinating season which tends to be fairly constant from year to year. In this region, trees generally pollinate from around the first of March through May, grass from the first of March until killing frost, ragweed in the fall, and marigold during the late summer. The actual amount of pollen in the air, at any given time, depends on the weather conditions, as well as total amount of pollen produced.

Pollen is measured using a Durham pollen sampler. Pollen is collected on a microscope slide which has been smeared with a light coating of white petroleum jelly or silicone grease. The slide is exposed for 24 hours and then returned to the laboratory where it is stained with a few drops of Calberia's staining solution. The pollen on the slide is read with a microscope on low power (10X). Five (5) scans across the stained area are counted, and the pollen count is computed as the number of grains of pollen per centimeter. The following is used for the pollen count:

0 to 5 Pollen Grains/cm	Slight
6 to 15 Pollen Grains/cm	Moderate
16 to 25 Pollen Grains/cm	Heavy
Greater than 25 Pollen Grains/cm	Extremely Heavy

The maximum daily pollen count for Nashville during 1999 was 689 grains/cm measured April 12, 1999, due to elm. During 1999, the pollen count was in the slight range 102 days or 59% of the days; in the moderate range 38 days or 22% of the days; in the heavy range 14 days or 8% of the days; and in the extremely heavy range 18 days or 10% of the days.

A daily update of the Pollen Count can be found on the Metropolitan Health Department website at http://healthweb.nashville.org or by calling the recorded message at (615) 340-0488.

8. VEHICLE INSPECTION/MAINTENANCE

The Federal Clean Air Act as amended mandates a Vehicle Inspection Maintenance Program in non-attainment areas that could not demonstrate attainment of the National Ambient Air Quality Standard for carbon monoxide and ozone by December 31, 1982. The allowable emission standards for various vehicle types and ages are listed in Table XXX. Metropolitan Nashville and Davidson County could not demonstrate attainment by December 31, 1982; therefore, a five-year extension was requested to demonstrate attainment of the National Ambient Air Quality Standard for carbon monoxide and ozone. This extension was granted based on Metropolitan Nashville and Davidson County implementing a Vehicle Inspection Maintenance Program by January 1, 1982. Failure to implement this mandatory vehicle inspection maintenance program could result in sanctions including Federal highway funds, air program funds and a construction moratorium.

Carbon monoxide (CO) is a colorless, odorless gas that is a product of incomplete combustion. The major source of carbon monoxide is the internal combustion engine; particularly the light duty gasoline powered vehicles. Ozone (O_3) is a colorless, pungent gas that is produced by the reaction of sunlight with hydrocarbon and nitrogen oxides. A major source of hydrocarbons and nitrogen oxides is the light duty gasoline powered vehicles.

This section describes the results of Metropolitan Nashville and Davidson County's Vehicle Inspection Maintenance Program for the period of January 1, 1999 through December 31, 1999.

INSPECTION MAINTENANCE PROGRAM DESCRIPTION

The Metropolitan Code of Nashville and Davidson County, Chapter 10.56, "Air Pollution Control," Section 10.56.240, "Internal Combustion Engines," authorizes the Metropolitan Board of Health to develop and implement a vehicle inspection maintenance program. On May 31, 1981, the Metropolitan Board of Health adopted the Metropolitan Health Department, Division of Pollution Control's, Regulation No. 8, "Regulation of Emissions From Light-Duty Motor Vehicles Through Mandatory Vehicle Inspection and Maintenance Program," which provides for a vehicle inspection program for all light duty vehicles manufactured from 1975 through current model year with a maximum gross vehicle weight of 8500 pounds or less. The only exceptions are diesel or electric powered light duty vehicles and motorcycles. This regulation was approved by the Metropolitan Council of Nashville and Davidson County May 17, 1983, Resolution No. R83-1471. The program approved by the Metropolitan Council is a centralized program operated by a contractor.

The Metropolitan Nashville and Davidson County Vehicle Inspection Program requires all light duty vehicles to be inspected annually. Vehicles found to have excessive emissions must be repaired and retested and must pass the emission standards prior to being issued a Metropolitan wheel tax license.

The Metropolitan Nashville and Davidson County's Vehicle Inspection Program uses an idle test procedure. The vehicles are tested at idle RPM with the transmission in neutral or park. If the vehicle fails to pass this test, a high RPM Precondition is used and the vehicle is given a second idle test. A vehicle does not fail the initial test unless if fails both of the idle tests. A licensed vehicle inspector licensed by the Metropolitan Health Department must make all inspections.

The Vehicle Inspection Program became mandatory January 1, 1985. Before the owner of a light duty vehicle can purchase the Metropolitan Nashville and Davidson County wheel tax license, they must show proof that the vehicle has met the allowable tailpipe emission standards of the Vehicle Inspection Program.

Effective December 1, 1994, the program was changed to require all vehicles, 1975 and newer, to go through the vehicle inspection program. The program was further expanded to require a visual three-point anti-tampering inspection. This includes: gas cap; gasoline inlet restrictor; and catalytic converter.

Table XXX
Maximum Idle Speed Allowable Emissions
During Idle Speed Test

Vehicle Model Year	Carbon Monoxide %		Hydrocarbon (PPM)	
	LIGHT DUTY VEHICLES LESS THAN OR EQUAL TO 6000 LBS. GVWR	LIGHT DUTY VEHICLES GREATER THAN 6000 LBS. GVWR	LIGHT DUTY VEHICLES LESS THAN OR EQUAL TO 6000 LBS. GVWR	LIGHT DUTY VEHICLES GREATER THAN 6000 LBS. GVWR
1975	5.0	6.5	500	750
1976	5.0	6.5	500	750
1977	5.0	6.5	500	750
1978	4.0	6.0	400	600
1979	4.0	6.0	400	600
1980	3.0	4.5	300	400
1981 & Newer	1.2	4.0	220	400

OPERATING STATISTICS

During 1999, the Nashville and Davidson County Vehicle Inspection Program performed 480,451 emission inspections. Compared to the 489,772 inspections done during 1998, there was a decrease of 9,321 inspections.

EMISSION INSPECTION PASSING AND FAIL RATES

Table XXXI is a summary of the total number of vehicles inspected during 1999. For 1999, the over-all pass rate was 93% and the fail rate was 7%.

TABLE XXXI
1999 SUMMARY OF VEHICLES TESTED

	Total
Number of Vehicles Tested	**480,451**
Number of Initial Test	**443,075**
Percent of Total Test	98.4%
Passed Initial Test	412,384
Percent Passed Initial Test	93.1%
Failed Initial Test	30,691
Percent Failed Initial Test	6.9%
Failed Carbon Monoxide Only	6,268
Percent of Failed Vehicles	20.4%
Failed Hydrocarbon Only	12,980
Percent of Failed Vehicles	42.3%
Failed both CO and HC	9,857
Percent of Failed Vehicles	32.1%
Failed Carbon Monoxide	16,125
Percent of Failed Vehicles	52.5%
Percent of Vehicles Tested	3.4%
Failed Hydrocarbon	22,837
Percent of Failed Vehicles	74.5%
Percent of Vehicles Tested	4.7%
Failed Tampering	2,473
Percent of Failed Vehicles	8.1%
Percent of Vehicles Tested	0.5%

TABLE XXXI (continued)
1999 SUMMARY OF VEHICLES TESTED

		Total
Number of First Retest		**26,594**
Passed First Retest	17,323	
Percent Passed First Retest	65.1%	
Failed First Retested	9,271	
Percent Failed First Retest	34.9%	
Failed Carbon Monoxide Only	2,315	
Percent of Failed Vehicles	25.0%	
Failed Hydrocarbon Only	3,664	
Percent of Failed Vehicles	39.5%	
Failed both CO and HC	3,276	
Percent of Failed Vehicles	35.3%	
Failed Carbon Monoxide	5,591	
Percent of Failed Vehicles	60.3%	
Percent of Vehicles Retested	21.0%	
Failed Hydrocarbon	6,940	
Percent of Failed Vehicles	74.9%	
Percent of Vehicles Retested	26.1%	
Failed Tampering	23	
Percent Failed Vehicles	0.2%	
Percent of Vehicles Retested	0.1%	
Number of Other Retest		**10,782**
Passed Other Retested	5,631	
Percent Passed Other Retest	52.2%	
Failed Other Retest	5,151	
Percent Failed Other Retest	47.8%	
Failed Carbon Monoxide Only	1,427	
Percent of Failed Vehicles	27.7%	
Failed Hydrocarbon Only	1,958	
Percent of Failed Vehicles	38.0%	
Failed both CO and HC	1,764	
Percent of Failed Vehicles	34.2%	
Failed Carbon Monoxide	2,891	
Percent of Failed Vehicles	56.1%	
Percent of Vehicles Retested	27.5%	
Failed Hydrocarbon	3,719	
Percent of Failed Vehicles	72.2%	
Percent of Vehicles Retested	34.5%	

Failed Tampering	2

The initial inspection fail rates have decreased significantly since the beginning of the Vehicle Inspection/Maintenance Program. The initial inspection fail rates rounded to the nearest percent by year since the program start-up are contained in Table XXXII.

TABLE XXXII
INITIAL EMISSION INSPECTION FAIL RATE

YEAR	FAIL RATE
1986	18%
1987	16%
1988	14%
1989	12%
1990	11%
1991	9%
1992	7%
1993	7%
1994	7%
1995	10%
1996	9%
1997	8%
1998	8%
1999	7%

The most reasonable explanation for the decreasing fail rates in the test program is that affected vehicles are being better maintained and many gross polluters have been taken out of service.

Getting motorists to maintain their vehicles is an essential goal of the program.

Also, note that the fail rate went up beginning in 1995 after years of decline. This is due to the adding of a three-point anti-tampering inspection into the program in 1995.

This data shows that Metropolitan Nashville and Davidson County, Tennessee's Vehicle Inspection/Maintenance Program is effective in reducing both carbon monoxide and hydrocarbon emissions from light duty vehicles.

QUALITY ASSURANCE

The Metropolitan Health Department Vehicle Inspection Staff is also assigned the duty of auditing all the emission inspection facilities in the Nashville program. The program has six test centers as seen in Table XXXIII.

TABLE XXXIII
TEST CENTER LOCATIONS
DAVIDSON COUNTY

Station 1	501 Craighead Street
Station 2	3494 Dickerson Road
Station 3	715 Gallatin Road North, Madison
Station 4	3363 Stoners Bend Drive
Station 5	1317 Antioch Pike
Station 6	7008 West Belt Drive

The audit involves review of inspection facility records and compliance with administrative requirements and tests of emission inspection equipment to ensure that the equipment is operating in accordance with all federal and local requirements. Audits are conducted twice a month on all inspection facilities. Gas analyzer audits involve tests to ensure that the gas analyzers are measuring criterion gases (i.e., hydrocarbons, carbon monoxide and carbon dioxide) accurately. During 1999, there were 588 gas analyzer audits on 13 gas analyzers used by the test centers. Fifty-seven audit failures were found during 1999. The audit results of gas analyzers continue to show that the equipment is very reliable.

Also, there were 14 undercover activities conducted on contractor inspection facilities.

ENFORCEMENT

During the 1999, inspection year different enforcement activities were instituted to ensure compliance with the vehicle inspection program. The staff issued the following:

Notices of violation	223
Citations	539
Court fines collected	$19,812.00

Due to the enforcement efforts of the staff, the Nashville and Davidson County Vehicle Inspection Program has a 98% compliance rate. Overall, the data shows that the Metropolitan Nashville and Davidson County, Tennessee's Vehicle Inspection/Maintenance Program is effective in reducing both carbon monoxide and hydrocarbon emissions from light duty vehicles, since the dirty vehicles are being identified and repaired.

9. OTHER ACTIVITIES

During 1999, the staff attended 27 EPA workshop training courses. Every six months, four environmentalists were certified by the State of Tennessee Visible Emission Evaluation School in 1999. The staff made 7 presentations.

In addition to the ambient monitoring activities previously presented, the Pollution Control Division Laboratory performed analysis on 72 samples for asbestos and 20 particulate samples.

During 1999, this agency's revenue included:

$585,768.41	Operating Permits
$104,437.16	Penalties
$401,859.90	Vehicle Inspection/Maintenance Program

Prepared by Fred L. Huggins
December, 2000